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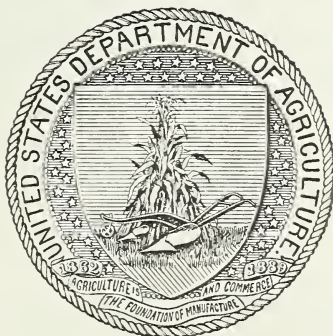
B. T. GALLOWAY, *Chief of Bureau.*

AMERICAN ROOT DRUGS.

BY

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF PLANT INDUSTRY,
OFFICE OF THE CHIEF,
Washington, D. C., April 16, 1907.

SIR: I have the honor to transmit herewith and to recommend for publication as Bulletin No. 107 of the series of this Bureau the accompanying manuscript, entitled "American Root Drugs." This paper was prepared by Miss Alice Henkel, Assistant in Drug-Plant Investigations, and has been submitted by the Physiologist in charge with a view to its publication.

The fifty drugs described include all the "official" roots found in this country, besides such "nonofficial" drugs as are most frequently quoted in drug catalogues.

There is a steady demand for information concerning the medicinal plants of this country, and this bulletin on American root drugs has been prepared as a first installment on the subject. It is intended as a guide and reference book for farmers, drug collectors, druggists, students, and others who may be interested in one way or another in the collection or study of our medicinal flora.

Respectfully,

B. T. GALLOWAY,
Chief of Bureau.

HON. JAMES WILSON,
Secretary of Agriculture.

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AMERICAN ROOT DRUGS.

INTRODUCTION.

More than half of the root drugs recognized in the Eighth Decennial Revision of the United States Pharmacopœia occur in this country, some native and not growing elsewhere and others introduced. All of the official root drugs found in the United States have been included in this bulletin, as well as such native and introduced "nonofficial" roots (those not at present recognized in the United States Pharmacopœia) as seemed to be most generally quoted in the trade lists of the country, the total number of root drugs described being 50. While the most important root drugs thus given are limited to 50, there are included under each of these, wherever required, brief descriptions of related species. It would be impossible to include within the limits of this paper all of the root drugs that are used in this country, but the aim has been to give information concerning those which seem to be the most important commercially, according to the numerous drug lists that have been consulted.

All of the root drugs herein mentioned occur in quantities sufficient for commercial purposes, but the roots of many of the species that also occur in other countries are nevertheless largely imported.

In speaking of "root drugs" in this paper only those are included of which the underground portion is found in commerce, whether in the form of root, rootstock, bulb, or corm, excluding the roots that are used solely for their bark or for their gums or resins.

Except in the botanical descriptions, the term "roots" is generally used, regardless of the fact that the part under consideration may be a rootstock, root, or bulb. In this the commercial practice is followed, which makes no distinction as to the form of the underground portion as classified by botanists, but catalogues them all under the general term "roots."

The medicinal uses are referred to in only the briefest and most general manner, for it is clearly not within the province of a publication of this character to go into details regarding these matters. The statements made are based on the information contained in various dispensatories and other works relating to materia medica.

The illustrations are for the most part made from a collection of photographs taken from nature by C. L. Lochman. A few have

been taken from various publications, mention of which is made under the illustrations in question.

THE COLLECTION OF ROOT DRUGS.

Generally speaking, the roots of annual plants should be dug just before flowering, and those of biennial or perennial plants late in autumn or early in spring, the object being to collect them at a period when there is a cessation of growth; for besides shrinking more and weighing less if collected during the growing season, they are also deficient in medicinal properties. Very frequently a drug is of inferior quality simply because the collector has neglected to gather it in the proper season.

It is unfortunate that so much confusion exists with regard to the common names of American plants. The common name of a plant in one locality may be the same as that of an entirely different plant in another locality, and on account of this confusion the collector is not always sure of the identity of the plant he is collecting, nor the drug dealer as to what he will receive, unless a sample is submitted to him. If more care were exercised in this respect it would mean a saving of time and money to both collector and dealer.

Another important matter that the collector sometimes overlooks is the proper cleaning and drying of the roots. To insure a good market for his crude drugs the collector should be certain not only that he has the right plant, but that it is collected at the proper season of the year, and that he has a clean and thoroughly dried article.

After the roots have been dug they should be freed from dirt and all foreign particles, such as stones and bits of other plants. If the adherent soil can not be removed by shaking the roots, they may, in most instances, be washed in clean water, after which they should be carefully dried. In some cases the roots are sliced or split when green in order to facilitate drying, and wherever this is necessary it will be indicated under the descriptions of the different plants.

For the purpose of drying, the roots should be spread out in thin layers on racks or shelves, or on clean, well-ventilated barn floors or lofts, exposed to light and air but not direct sunlight, and turned occasionally each day until thoroughly dry. If the roots are dried out of doors, they should be placed under shelter at night or upon the approach of damp or rainy weather. Thoroughly dried roots snap readily when bent, and it requires from three to six weeks to cure roots, depending upon the weather conditions and the character of the roots.

Burlap or gunny sacks, or dry, clean barrels may be used for packing the roots for shipment.

The collector should always communicate with the dealers concerning the drugs to be disposed of, sending them a representative sample, plainly marked as to contents, with the name and address of the sender, and stating how large a quantity can be furnished.

The prices per pound mentioned in this bulletin will serve to give the collector an idea as to what he may expect to receive from dealers, but, as with other commodities, depending for their prices upon supply and demand, fluctuations are likely to occur from year to year. An increased demand or a shortage will send prices upward and stimulate collection, which in turn may result in glutting the market, and a decline in prices naturally follows. It is possible, therefore, to give only an approximate range of prices.

PLANTS FURNISHING ROOT DRUGS.

Under each plant will be found synonyms and pharmacopœial name, if any, the common names, habitat, range, descriptions of the plant and root, and information concerning collection, prices, and uses, while in the case of goldenseal and ginseng the methods of culture are included.

MALE-FERN.

- (1) *Dryopteris filix-mas* (L.) Schott and (2) *Dryopteris marginalis* (L.) A. Gray.

Synonyms.—(1) *Aspidium filix-mas* Sw. (2) *Aspidium marginale* Sw.

Pharmacopœial name.—*Aspidium*.

Other common names.—(1) Male shield-fern, sweet brake, knotty brake, basket-fern, bear's-paw root; (2) marginal-fruited shield-fern, evergreen wood-fern.

Habitat and range.—These ferns are found in rocky woods, the male shield-fern inhabiting the region from Canada westward to the Rocky Mountains and Arizona. It is widely distributed also through Europe, northern Asia, northern Africa, and South America. The marginal-fruited shield-fern (Pl. I, fig. 1), one of our most common ferns, occurs from Canada southward to Alabama and Arkansas.

Description of plants.—Both of these species are tall, handsome ferns, the long, erect fronds, or leaves, arising from a chaffy, scaly base, and consisting of numerous crowded stemless leaflets, which are variously divided and notched. There is but little difference between these two species. The male shield-fern is perhaps a trifle stouter, the leaves growing about 3 feet in length and having a bright-green color, whereas the marginal-fruited shield-fern has lighter green leaves, about 2½ feet in length, and is of more slender appearance. The principal difference, however, is found in the arrangement of the "sori," or "fruit dots." These are the very small, round, tawny dots that are found on the backs of fern leaves, and in the male shield-fern these will be found arranged in short rows near the midrib, while in the marginal-fruited shield-fern, as this name indicates, the fruit dots are placed on the margins of the fronds. Both plants are perennials and members of the fern family (Polypodiaceæ).

Description of the rootstock.—These ferns have stout ascending or erect chaffy rootstocks, or rhizomes (Pl. I, fig. 1) as they are technically known. As taken from the ground the rootstock is from 6 to 12 inches in length and 1 to 2 inches thick, covered with closely overlapping, brown, slightly curved stipe bases or leaf bases and soft, brown, chaffy scales. The inside of the rootstock is pale green. As found in the stores, however, male-fern with the stipe bases and roots removed measures about 3 to 6 inches in length and about one-half to 1 inch in thickness, rough where the stipe bases have been removed, brown outside, pale green and rather spongy inside.

The stipe bases remain green for a very long period, and these small, claw-shaped, furrowed portions, or "fingers" as they are called, form a large proportion of the drug found on the American market and, in fact, are said to have largely superseded the rootstock. Male-fern has a disagreeable odor, and the taste is described as bitter-sweet, astringent, acrid, and nauseous.

Collection, prices, and uses.—The best time for collecting male-fern root is from July to September. The root should be carefully cleaned, but not washed, dried out of doors in the shade as quickly as possible, and shipped to druggists at once. The United States Pharmacopœia directs that "the chaff, together with the dead portions of the rhizome and stipes, should be removed, and only such portions used as have retained their internal green color."

Great care is necessary in the preservation of this drug in order to prevent it from deteriorating. If kept too long, its activity will be impaired, and it is said that it will retain its qualities much longer if it is not peeled until required for use. The unreliability sometimes attributed to this drug can in most instances be traced to the presence of the rootstocks of other ferns with which it is often adulterated, or it will be found to be due to improper storing or to the length of time that it has been kept.

The prices paid for male-fern root range from 5 to 10 cents a pound.

Male-fern, official in the United States Pharmacopœia, has been used since the remotest times as a remedy for worms. Grave results are sometimes caused by overdoses.

COUCH-GRASS.

Agropyron repens (L.) Beauv.

Synonym.—*Triticum repens* L.

Pharmacopœial name.—*Triticum*.

Other common names.—Dog-grass, quick-grass, quack-grass, quitch-grass, quake-grass, scutch-grass, twitch-grass, witch-grass, wheat-grass, creeping wheat-grass, devil's-grass, durfa-grass, Durfee-grass, Dutch-grass, Fin's-grass, Chandler's-grass.

Habitat and range.—Like many of our weeds, couch-grass was introduced from Europe, and is now one of the worst pests the farmer has to contend with, taking possession of cultivated ground and crowding out valuable crops. It occurs most abundantly from Maine to Maryland, westward to Minnesota and Missouri, and is spreading on farms on the Pacific slope, but is rather sparingly distributed in the South.

Description of plant.—Couch-grass is rather coarse, 1 to 3 feet high, and when in flower very much resembles rye or beardless wheat (fig. 1). Several round, smooth, hollow stems, thickened at the joints, are produced from the long, creeping, jointed rootstock. The stems bear 5 to 7 leaves from 3 to 12 inches long, rough on the upper surface and smooth beneath, while the long, cleft leaf sheaths are smooth. The solitary terminal flowering heads or spikes

are compressed, and consist of two rows of spikelets on a wavy and flattened axis. These heads are produced from July to September. Couch-grass belongs to the grass family (Poaceæ).

Description of rootstock.—The pale-yellow, smooth rootstock is long, tough, and jointed, creeping along underneath the ground and pushing in every direction. As found in the stores, it consists of short, angular pieces, from one-eighth to one-fourth of an inch long, of a shining straw color, and hollow. These pieces are odorless, but have a somewhat sweetish taste.

Collection, prices, and uses.—Couch-grass, which is official in the United States Pharmacopœia, should be collected in spring, carefully cleaned, and the rootlets removed. The rootstock (not the rootlets) is then cut into short pieces, about two-fifths of an inch in length, for which purpose an ordinary feed-cutting machine may be used, and thoroughly dried.

Couch-grass is usually destroyed by plowing up and burning, for if any of the joints are permitted to remain in the soil new plants will be produced. But, instead of burning, the rootstocks may be saved and prepared for the drug market in the manner above stated. The prices range from 3 to 5 cents a pound. At present couch-grass is collected chiefly in Europe.

A fluid extract is prepared from couch-grass, which is used in affections of the kidney and bladder.

WILD TURNIP.

Arisaema triphyllum (L.) Torr.

Synonym.—*Arum triphyllum* L.

Other common names.—Arum, three-leaved arum, Indian turnip, jack-in-the-pulpit, wake-robin, wild pepper, dragon-turnip, brown dragon.

devil's-ear, marsh-turnip, swamp-turnip, meadow-turnip, pepper-turnip, starch-wort, bog-onion, priest's-pintle, lords-and-ladies.

Habitat and range.—Wild turnip inhabits moist woods from Canada to Florida and westward to Kansas and Minnesota.

Description of plant.—Early in April the quaint green and brownish purple hooded flowers of the wild turnip may be seen in the shady depths of the woods.

It is a perennial plant belonging to the arum family (Araceæ), and reaches a height of from 10 inches to 3 feet. The leaves, of which there are only one or two, unfold with the flowers; they are borne on long, erect, sheathing stalks,



FIG. 1.—Couch-grass (*Agropyron repens*).

and consist of three smooth, oval leaflets; the latter are 3 to 6 inches long, and from $1\frac{1}{2}$ to $3\frac{1}{2}$ inches wide, net veined, and with one vein running parallel with the margins. The "flower" is curiously formed, somewhat like the calla lily, consisting of what is known botanically as a spathe, within which is inclosed the spadix. The spathe is an oval, leaflike part, the lower portion of which, in the flower under consideration, is rolled together so as to form a tube, while the upper, pointed part is usually bent forward, thus forming a flap or hood over the tube-shaped part which contains the spadix. (Fig. 2.) In fact it is very similar to the familiar flower of the calla lily of the gardens, except that, instead of being white, the wild turnip is either all green or striped with very dark purple, sometimes seeming almost black, and in the calla lily the "flap" is turned back, whereas in the wild turnip it is bent forward over the tube.



FIG. 2.—Wild turnip (*Arisaema triphyllum*).

Inside of the spathe is the spadix, also green or purple, which is club shaped, rounded at the summit, and narrowly contracted at the base, where it is surrounded by either the male or female flowers or both, in the latter case (the most infrequent) the male flowers being placed below the female flowers. In autumn the fruit ripens in the form of a bunch of bright scarlet, shining berries. The entire plant is acrid, but the root more especially so.

Description of "root."—The underground portion of this plant is known botanically as a "corm," and is somewhat globular and shaped like a turnip. The lower part of the corm is flat and wrinkled, while the upper part is surrounded by coarse, wavy rootlets. The outside is brownish gray and the inside white and mealy. It has no odor, but an intensely acrid,

burning taste, and to those who may have been induced in their school days to taste of this root wild turnip will be familiar chiefly on account of its never-to-be-forgotten acrid, indeed caustic, properties. The dried article of commerce consists of round, white slices, with brown edges, only slightly shrunken, and breaking with a starchy fracture.

Collection, prices, and uses.—The partially dried corm is used in medicine. It is dug in summer, transversely sliced, and dried. When first dug it is intensely acrid, but drying and heat diminish the acidity. It loses its acidity rapidly with age. Wild turnip brings from 7 to 10 cents a pound.

The corm of wild turnip, which was official in the United States Pharmacopœia from 1820 to 1870, is used as a stimulant, diaphoretic, expectorant, and irritant.

SKUNK-CABBAGE.

Spathyema foetida (L.) Raf.

Synonyms.—*Dracontium foetidum* L.; *Symplocarpus foetidus* Nutt.

Other common names.—*Dracontium*, skunkweed, polecat-weed, swamp-cabbage, meadow-cabbage, collard, fetid hellebore, stinking poke, pockweed.

Habitat and range.—Swamps and other wet places from Canada to Florida, Iowa, and Minnesota abound with this ill-smelling herb.

Description of plant.—Most of the common names applied to this plant, as well as the scientific names, are indicative of the most striking characteristic of this early spring visitor, namely, the rank, offensive, carrion odor that emanates from it. Skunk-cabbage is one of the very earliest of our spring flowers, appearing in February or March, but it is safe to say that it is not likely to suffer extermination at the hands of the enthusiastic gatherer of spring flowers. In the latitude of Washington skunk-cabbage has been known to be in flower in December.

It is a curious plant, with its hood-shaped, purplish striped flowers appearing before the leaves. It belongs to the arum family (Araceæ) and is a perennial. The "flower" is in the form of a thick, ovate, swollen spathe, about 3 to 6 inches in height, the top pointed and curved inward, spotted and striped with purple and yellowish green. The spathe is not open like that of the wild turnip or calla lily, to which family this plant also belongs, but the edges are rolled inward, completely hiding the spadix. In this plant the spadix is not spike-like, as in the wild turnip, but is generally somewhat globular, entirely covered with the numerous, dull-purple flowers. (Pl. I, fig. 2.) After the fruit has ripened the spadix will be found to have grown considerably, the spathe meantime having decayed.

The leaves, which appear after the flower, are numerous and very large, about 1 to 3 feet in length and about 1 foot in width; they are thin in texture, but prominently nerved with fleshy nerves, and are borne on deeply channeled stems.

Description of rootstock.—Skunk-cabbage has a thick, straight, reddish brown rootstock, from 3 to 5 inches long, and about 2 inches in diameter, and having a whorl of crowded fleshy roots (Pl. I, fig. 2) which penetrate the soil to considerable depth. The dried article of commerce consists of either the entire rootstock and roots, which are dark brown and wrinkled on the outside, whitish and starchy within, or of very much compressed, wrinkled, transverse slices. When bruised, the root has the characteristic fetid odor of the plant and possesses a sharp acrid taste, both of which become less the longer the root is kept.

Collection, prices, and uses.—The rootstock of skunk-cabbage should be collected early in spring, soon after the appearance of the flower, or after the seeds have ripened, in August or September. It should be carefully dried, either in its entire state or deprived of the roots and cut into transverse slices. Skunk-cabbage loses its odor and acidity with age, and should therefore not be kept longer than one season. The range of prices is from 4 to 7 cents a pound.

Skunk-cabbage, official from 1820 to 1880, is used in affections of the respiratory organs, in nervous disorders, rheumatism, and dropsical complaints.

SWEET-FLAG.

Acorus calamus L.

Pharmacopœial name.—Calamus.

Other common names.—Sweet cane, sweet grass, sweet myrtle, sweet rush, sweet sedge, sweet segg, sweetroot, cinnamon-sedge, myrtle-flag, myrtle-grass, myrtle-sedge, beewort.

Habitat and range.—This plant frequents wet and muddy places and borders of streams from Nova Scotia to Minnesota, southward to Florida and Texas, also occurring in Europe and Asia. It is usually partly immersed in water, and is generally found in company with the cat-tail and other water-loving species of flag.

Description of plant.—The swordlike leaves of the sweet-flag resemble those of other flags so much that before the plant is in flower it is difficult to recognize simply by the appearance of its leaves. The leaves of the blue flag or "poison-flag," as it has been called, are very similar to those of the sweet-flag, and this resemblance often leads to cases of poisoning among children who thus mistake one for the other. However, as the leaves of the sweet-flag are fragrant, the odor will be a means of recognizing it. Of course when the sweet-flag is in flower the identification of the plant is easy.

The sheathing leaves of this native perennial, which belongs to the arum family (Araceæ), are from 2 to 6 feet in height and about 1 inch in width; they are sharp pointed and have a ridged midrib running their entire length. The flowering head, produced from the side of the stalk, consists of a fleshy spike sometimes $3\frac{1}{2}$ inches long and about one-half inch in thickness, closely covered with very small greenish yellow flowers, which appear from May to July. (Pl. I, fig. 3.)

Description of rootstock.—The long, creeping rootstock of the sweet-flag is thick and fleshy, somewhat spongy, and producing numerous rootlets. (Pl. I, fig. 3.) The odor is very aromatic and agreeable, and the taste pungent and bitter. The dried article, as found in the stores, consists of entire or split pieces of various lengths, from 3 to 6 inches, light brown on the outside with blackish spots, sharply wrinkled lengthwise, the upper surface marked obliquely with dark leaf scars, and the lower surface showing many small circular scars, which, at first glance, give one the impression that the root is worm-eaten, but which are the remains of rootlets that have been removed from the rootstock. Internally the rootstock is whitish and of a spongy texture. The aromatic odor and pungent, bitter taste are retained in the dried article.

Collection, prices, and uses.—The United States Pharmacopœia directs that the unpeeled rhizome, or rootstock, be used. It is collected either in early spring or late in autumn. It is pulled or grubbed from the soft earth, freed from adhering dirt, and the rootlets removed, as these are not so aromatic and more bitter. The rootstock is then carefully dried, sometimes by means of moderate heat. Sweet-flag deteriorates with age and is subject to the attacks of worms. It loses about three-fourths of its weight in drying.

Some of the sweet-flag root found in commerce consists of handsome white pieces. These usually come from Germany, and have been peeled before drying, but they are not so strong and aromatic as the unpeeled roots. Unpeeled sweet-flag root brings from 3 to 6 cents a pound.

Sweet-flag is employed as an aromatic stimulant and tonic in feeble digestion. The dried root is frequently chewed for the relief of dyspepsia.

CHAMAELIRIUM, OR HELONIAS.

Chamaelirium luteum (L.) A. Gray.

Synonym.—*Helonias dioica* Pursh.

Other common names.—Unicorn-root, false unicorn-root, blazingstar, drooping starwort, starwort, devil's-bit, unicorn's-horn.

In order to avoid the existing confusion of common names of this plant, it is most desirable to use the scientific names *Chamaelirium* or *Helonias* exclusively. *Chamaelirium* is the most recent botanical designation and will be used throughout this article, but the synonym *Helonias* is a name very frequently employed by the drug trade. The plant with which it is so much confused, *Aletris farinosa*, will also be designated throughout by its generic name, *Aletris*.

Habitat and range.—This native plant is found in open woods from Massachusetts to Michigan, south to Florida and Arkansas.

Description of plant.—*Chamaelirium* and *Aletris* (*Aletris farinosa*) have long been confused by drug collectors and others, owing undoubtedly to the transposition of some of their similar common names, such as "starwort" and "stargrass." The plants can scarcely be said to resemble each other, however, except perhaps in their general habit of growth. (See Pl. II, figs. 1 and 2.)

The male and female flowers of *Chamaelirium* are borne on separate plants, and in this respect are entirely different from *Aletris*; neither do the flowers resemble those of *Aletris*.

Chamaelirium is an erect, somewhat fleshy herb, perennial, and belongs to the bunchflower family (Melanthiaceæ). The male plant grows to a height of from 1½ to 2½ feet, and the female plant is sometimes 4 feet tall and is also more leafy.

The plants have both basal and stem leaves, whereas *Aletris* has only the basal leaves. The basal leaves of *Chamaelirium* are broad and blunt at the top, narrowing toward the base into a long stem; they are sometimes so much broadened at the top that they may be characterized as spoon shaped, and are from 2 to 8 inches long and from one-half to 1½ inches wide. The stem leaves are lance shaped and sharp pointed, on short stems or stemless. (Pl. II, fig. 1.)

The white starry flowers of *Chamaelirium* are produced from June to July, those of the male plant being borne in nodding, graceful, plumelike spikes 3 to 9 inches long (Pl. II, fig. 1) and those of the female plant in erect spikes. The many-seeded capsule is oblong, opening by three valves at the apex.

Another species is now recognized, *Chamaelirium obovale* Small, which seems to differ chiefly in having larger flowers and obovoid capsules.

Description of rootstock.—The rootstock of *Chamaelirium* does not in the least resemble that of *Aletris*, with which it is so generally confused. It is from one-half to 2 inches in length, generally curved upward at one end in the form of a horn (whence the common name, "unicorn") and having the appearance of having been bitten off. (Pl. II, fig. 1.) It is of a dark-brown color, with fine transverse wrinkles, rough, on the upper surface showing a few stem scars, and giving off from all sides numerous brown fibrous rootlets. The more recent rootlets have a soft outer covering, which in the older rootlets has worn away, leaving the fine but tough and woody whitish center. The rootlets penetrate to the central part of the rootstock, and this serves as a distinguishing character from *Aletris*, as a transverse section of *Chamaelirium* very plainly shows these fibers extending some distance within the rootstock. Furthermore, the rootstock of *Chamaelirium* exhibits a number of small holes wherever these rootlets

have broken off, giving it the appearance of having become "wormy." It is hard and horny within and has a peculiar odor and a very bitter, disagreeable taste, whereas *Aletris* is not at all bitter.

Collection, prices, and uses.—*Chamaelirium* should be collected in autumn. The prices paid to collectors may be said to range from about 30 to 45 cents a pound. In the fall of 1906 a scarcity of this root was reported. As already indicated, *Chamaelirium* and *Aletris* are often gathered and mistaken for each other by collectors, but, as will be seen from the preceding description, there is really no excuse for such error.

From the confusion that has existed properties peculiar to the one plant have also been attributed to the other, but it seems now generally agreed that *Chamaelirium* is of use especially as a tonic in derangements of women.

AMERICAN HELLEBORE.

Veratrum viride Ait.

Pharmacopœial name.—*Veratrum*.

Other common names.—True veratrum, green veratrum, American veratrum, green hellebore, swamp-hellebore, big hellebore, false hellebore, bear-corn, bugbane, bugwort, devil's-bite, earth-gall, Indian poke, itchweed, tickleweed, duckretter.

Habitat and range.—American hellebore is native in rich wet woods, swamps, and wet meadows, its range extending from Canada, Alaska, and Minnesota south to Georgia.

Description of plant.—Early in spring, usually in company with the skunk-cabbage, the large, bright-green leaves of American hellebore make their way through the soil, their straight, erect leaf spears forming a conspicuous feature of the yet scanty spring vegetation. Later in the season a stout and erect leafy stem is sent up, sometimes growing as tall as 6 feet. It is solid and round, pale green, very leafy, and closely surrounded by the sheathing bases of the leaves, unbranched except in the flowering head. The leaves are hairy, prominently nerved, folded or pleated like a fan. They have no stems, but their bases encircle or sheathe the main stalk, and are very large, especially the lower ones, which are from 6 to 12 inches in length, from 3 to 6 inches in width, and broadly oval. As they approach the top of the plant the leaves become narrower. The flowers, which appear from May to July, are greenish yellow and numerous, and are borne in rather open clusters. American hellebore belongs to the bunchflower family (*Melanthiaceae*) and is a perennial.

This species is a very near relative of the European white hellebore (*Veratrum album* L.), and in fact has by some been regarded as identical with it, or at least as a variety of it. It is taller than *V. album* and has narrower leaves and greener flowers. Both species are official in the United States Pharmacopœia.

Description of rootstock.—The fresh rootstock of American hellebore is ovoid or obconical, upright, thick, and fleshy, the upper part of it arranged in layers, the lower part of it more solid, and producing numerous whitish roots from all sides. In the fresh state it has a rather strong, disagreeable odor. As found in commerce, American hellebore rootstock is sometimes entire, but more generally sliced, and is of a light-brown or dark-brown color externally and internally yellowish white; the roots, which are from 4 to 8 inches long, have a shriveled appearance, and are brown or yellowish. There is no odor to the

dried rootstock, but when powdered it causes violent sneezing. The rootstock, which has a bitter and very acrid taste, is poisonous.

Collection, prices, and uses.—American hellebore should be dug in autumn after the leaves have died, and washed and carefully dried, either in the whole state or sliced in various ways. It deteriorates with age, and should therefore not be kept longer than a year.

The adulterations sometimes met with are the rootstocks of related plants, and the skunk-cabbage is also occasionally found mixed with it, but this is probably unintentional, as the two plants usually grow close together.

Collectors of American hellebore root receive from about 3 to 10 cents a pound.

American hellebore, official in the United States Pharmacopœia, is an acrid, narcotic poison, and has emetic, diaphoretic, and sedative properties.

ALETRIS.

Aletris farinosa L.

Other common names.—Stargrass, blazingstar, mealy starwort, starwort, unicorn-root, true unicorn-root, unicorn-plant, unicorn's-horn, colic-root, devil's-bit, ague-grass, ague-root, aloe-root, crow-corn, huskwort.

A glance at these common names will show many that have been applied to other plants, especially to *Chamaelirium*, with which *Aletris* is so much confused. In order to guard against this confusion as much as possible, it is best not to use the common names of this plant at all, referring to it only by its generic name, *Aletris*.

Habit and range.—*Aletris* occurs in dry, generally sandy soil, from Maine to Minnesota, Florida, and Tennessee.

Description of plant.—As stated under *Chamaelirium*, this plant is often confused with the former by collectors and others, although there seems to be no good reason why this should be so. The plants do not resemble each other except in habit of growth (see Pl. II. figs. 1 and 2), and the trouble undoubtedly arose from a confusion of the somewhat similar common names of the plants, as, for instance, "stargrass" and "starwort."

Aletris may be at once distinguished by the grasslike leaves, which spread out on the ground in the form of a star, and by the slender spikes of rough, mealy flowers.

This native perennial, belonging to the lily family (*Liliacæ*), is an erect, slender herb, 1½ to 3 feet tall, with basal leaves only. These leaves are grasslike, from 2 to 6 inches long, and have a yellowish green or willow-



FIG. 3.—American hellebore (*Veratrum viride*).

green color. As already stated, they surround the base of the stem in the form of a star. Instead of stem leaves, there are very small, leaflike bracts placed at some distance apart on the stem. From May to July the erect flowering spike, from 4 to 12 inches long, is produced, bearing white, urn-shaped flowers, sometimes tinged with yellow at the apex, and having a rough, wrinkled and mealy appearance. (Pl. II, fig. 2.) The seed capsule is ovoid, opening by three valves, and containing many seeds. When the flowers in the spike are still in bud, there is a suggestion of resemblance to the female spike of *Chamaelirium* with its fruit half formed.

Several other species are recognized by botanists, namely, *Aletris aurea* Walt., *A. lutea* Small, and *A. obovata* Nash, but aside from the flowers, which in *aurea* and *lutea* are yellow, and slight variations in form, such as a more contracted perianth, the differences are not so pronounced that the plants would require a detailed description here. They have undoubtedly been collected with *Aletris farinosa* for years, and are sufficiently like it to be readily recognized.

Description of rootstock.—Not only have the plants of *Aletris* and *Chamaelirium* been confused, but the rootstocks as well. There is, however, no resemblance between them.

Aletris has a horizontal rootstock from one-half to 1½ inches in length, rough and scaly, and almost completely hidden by the fibrous roots and remains of the basal leaves. Upon close examination the scars of former leaf stems may be seen along the upper surface. The rootlets are from 2 to 10 inches in length, those of recent growth whitish and covered with several layers of epidermis which gradually peel off, and the older rootlets of the rootstock showing this epidermis already scaled off, leaving only the hard, brown, woody center. The rootstock in commerce almost invariably shows at one end a tuft of the remains of the basal leaves, which do not lose their green color. It is grayish brown outside, whitish within, and breaks with a mealy fracture. It has no odor, and a starchy taste, followed by some acidity, *but no bitterness*.

Collection, prices, and uses.—*Aletris* should be collected in autumn, and there is no reason why collectors should make the common mistake of confusing *Aletris* with *Chamaelirium*. By comparing the description of *Aletris* with that of *Chamaelirium*, it will be seen that there is scarcely any resemblance. *Aletris* ranges from 20 to 40 cents a pound.

As indicated under *Chamaelirium*, the medicinal properties have also been considered the same in both plants, but *Aletris* is now regarded of value chiefly in digestive troubles. *Aletris* was official in the United States Pharmacopœia from 1820 to 1870.

BETHROOT.

Trillium erectum L.

Other common names.—*Trillium*, red *trillium*, purple *trillium*, ill-scented *trillium*, birthroot, birthwort, bathwort, bathflower, red wake-robin, purple wake-robin, ill-scented wake-robin, red-benjamin, bumblebee-root, daffydown-dilly, dishcloth, Indian balm, Indian shamrock, nosebleed, squawflower, squawroot, wood-lily, true-love, orange-blossom. Many of these names are applied also to other species of *Trillium*.

Habitat and range.—Bethroot is a native plant growing in rich soil in damp, shady woods from Canada south to Tennessee and Missouri.

Description of plant.—This plant is a perennial belonging to the lily-of-the-valley family (*Convallariaceae*). It is a low growing plant, from about 8 to 16 inches in height, with a rather stout stem, having three leaves arranged in

a whorl near the top. These leaves are broadly ovate, almost circular in outline, sharp pointed at the apex and narrowed at the base, 3 to 7 inches long and about as wide, and practically stemless.

Not only the leaves of this plant, but the flowers and parts of the flowers are arranged in threes, and this feature will serve to identify the plant. (Pl. I, fig. 4.) The solitary terminal flower of bethroot has three sepals and three petals, both more or less lance shaped and spreading, the former greenish, and the petals, which are $1\frac{1}{4}$ inches long and one-half inch wide, are sometimes dark purple, pink, greenish, or white. The flower has an unpleasant odor. It appears from April to June and is followed later in the season by an oval, reddish berry.

Various other species of *Trillium* are used in medicine, possessing properties similar to those of the species under consideration. These are also very similar in appearance to *Trillium erectum*.

Description of root.—Bethroot (Pl. I, fig. 4), as found in the stores, is short and thick, of a light-brown color externally, whitish or yellowish inside, somewhat globular or oblong in shape, and covered all around with numerous pale-brown, shriveled rootlets. The top of the root generally shows a succession of fine circles or rings, and usually bears the remains of stem bases.

The root has a slight odor, and is at first sweetish and astringent, followed by a bitter and acrid taste. When chewed it causes a flow of saliva.

Collection, prices, and uses.—Bethroot is generally collected toward the close of summer. The price ranges from 7 to 10 cents a pound.

It was much esteemed as a remedy among the Indians and early settlers. Its present use is that of an astringent, tonic, and alterative, and also that of an expectorant.

WILD YAM.

Dioscorea villosa L.

Other common names.—*Dioscorea*, colicroot, rheumatism-root, devil's-bones.

Habitat and range.—Wild yam grows in moist thickets, trailing over adjacent shrubs and bushes, its range extending from Rhode Island to Minnesota, south to Florida and Texas. It is most common in the central and southern portions of the United States.

Description of plant.—This native perennial vine is similar to and belongs to the same family as the well-known cinnamon vine of the gardens—namely, the yam family (*Dioscoreaceæ*). It attains a length of about 15 feet, the stem smooth, the leaves heart shaped and 2 to 6 inches long by 1 to 4 inches wide.

The leaves, which are borne on long, slender stems, are thin, green, and smooth on the upper surface, paler and rather thickly hairy on the under surface. The small greenish yellow flowers are produced from June to July, the male flowers borne in drooping clusters about 3 to 6 inches long, and the female flowers in drooping spikelike heads. The fruit, which is in the form of a dry, membranous, 3-winged, yellowish green capsule, ripens about September and remains on the vine for some time during the winter. (Pl. II, fig. 3.)

Growing farther south than the species above mentioned is a variety for which the name *glabra* has been suggested.

According to C. G. Lloyd (King's American Dispensatory, Vol. I, 1898), there is a variety of *Dioscorea villosa* the root of which first made its appearance among the true yam roots of commerce, and which was so different in form that it was rejected as an adulteration. The plant, however, from

which the false root was derived was found upon investigation to be almost identical with the true yam, except that the leaves were perfectly smooth, lacking the hairiness on the under surface of the leaf which is characteristic of the true wild yam. The false variety also differs in its habit of growth, not growing in dense clumps like the true wild yam, but generally isolated. The root of the variety, however, is quite distinct from that of the true wild yam, being much more knotty. Lloyd states further that the hairiness or lack of hairiness on the under side of the leaf is a certain indication as to the form of the root.

Lloyd, recognizing the necessity of classifying these two yam roots of commerce, has designated the smooth-leaved variety as *Dioscorea villosa* var. *glabra*.

Description of rootstocks.—The rootstock of the true wild yam (Pl. II, fig. 3) runs horizontally underneath the surface of the ground. As found in commerce, it consists of very hard pieces, 6 inches and sometimes 2 feet in length, but only about one-fourth or one-half of an inch in diameter, twisted, covered with a thin brown bark, whitish within, and showing stem scars almost an inch apart on the upper surface, small protuberances on the sides, and numerous rather wiry rootlets on the lower surface.

The false wild yam, on the other hand, has a much heavier, rough, knotty rootstock, with thick branches from 1 inch to 3 inches long, the upper surface covered with crowded stem scars and the lower side furnished with stout wiry rootlets. Within it is similar to the true yam root.

Collection, prices, and uses.—The roots are generally collected in autumn, and bring from 2½ to 4 cents a pound. Wild yam is said to possess expectorant properties and to promote perspiration, and in large doses proving emetic. It has been employed in bilious colic, and by the negroes in the South in the treatment of muscular rheumatism.

BLUE FLAG.

Iris versicolor L.

Other common names.—Iris, flag-lily, liver-lily, snake-lily, poison-flag, water-flag, American fleur-de-lis or flower-de-luce.

Habitat and range.—Blue flag delights in wet, swampy localities, making its home in marshes, thickets, and wet meadows from Newfoundland to Manitoba, south to Florida and Arkansas.

Description of plant.—The flowers of all of the species belonging to this genus are similar, and are readily recognized by their rather peculiar form, the three outer segments or parts reflexed or turned back and the three inner segments standing erect.

Blue flag is about 2 to 3 feet in height, with an erect stem sometimes branched near the top, and sword-shaped leaves which are shorter than the stem, from one-half to 1 inch in width, showing a slight grayish "bloom," and sheathing at the base. This plant is a perennial belonging to the iris family (Iridaceæ), and is a native of this country. June is generally regarded as the month for the flowering of the blue flag, although it may be said to be in flower from May to July, depending on the locality. The flowers are large and very handsome, each stem bearing from two to six or more. They consist of six segments or parts, the three outer ones turned back and the three inner ones erect and much smaller. (Pl. II, fig. 4.) The flowers are usually purplish blue, the "claw," or narrow base of the segments, variegated with yellow, green, or white and marked with purple veins.

All of the species belonging to this genus are more or less variegated in color; hence the name "iris," meaning "rainbow," and the specific name "versicolor," meaning "various colors." The name "poison-flag" has been applied to it on account of the poisonous effect it has produced in children, who, owing to the close resemblance of the plants before reaching the flowering stage, sometimes mistake it for sweet-flag.

The seed capsule is oblong, about $1\frac{1}{2}$ inches long, and contains numerous seeds.

Description of rootstock.—Blue flag has a thick, fleshy, horizontal rootstock, branched, and producing long fibrous roots. (Pl. II, fig. 4.) It resembles sweet-flag (*Calamus*), and has been mistaken for it. The sections of the rootstock of blue flag, however, are flattened above and rounded below; the scars of the leaf sheaths are in the form of rings, whereas in sweet-flag the rootstock is cylindrical and the scars left by the leaf sheaths are obliquely transverse. Furthermore, there is a difference in the arrangement of the roots on the rootstock, the scars left by the roots in blue flag being close together generally nearer the larger end, while in sweet-flag the disposition of the roots along the rootstock is quite regular. Blue flag is grayish brown on the outside when dried, and sweet-flag is light brown or fawn colored. Blue flag has no well-marked odor, and the taste is acrid and nauseous, and in sweet-flag there is a pleasant odor and bitter, pungent taste.

Collection, prices, and uses.—Blue flag is collected in autumn, and usually brings from about 7 to 10 cents a pound. Great scarcity of blue flag root was reported from the producing districts in the autumn of 1906. It is an old remedy, the Indians esteeming it highly in stomach troubles, and it is said that it was sometimes cultivated by them in near-by ponds on account of its medicinal value. It has also been used as a domestic remedy, and is regarded as an alterative, diuretic, and purgative. It was official in the United States Pharmacopœia of 1890.

LADY'S-SLIPPER.

(1) *Cypripedium hirsutum* Mill. and (2) *Cypripedium parviflorum* Salisb.

Synonym.—(1) *Cypripedium pubescens* Willd.

Pharmacopœial name.—*Cypripedium*.

Other common names.—(1) Large yellow lady's-slipper, yellow lady's-slipper, yellow moccasin-flower, Venus'-shoe, Venus'-cup, yellow Indian-shoe, American valerian, nerve-root, male nervine, yellow Noah's-ark, yellows, monkey-flower, umbil-root, yellow umbil; (2) small yellow lady's-slipper.

Habitat and range.—Both of these native species frequent bogs and wet places in deep shady woods and thickets. The large yellow lady's-slipper may be found from Nova Scotia south to Alabama and west to Nebraska and Missouri. The range for the small yellow lady's-slipper extends from Newfoundland south along the mountains to Georgia, and west to Missouri, Washington, and British Columbia.

Description of plants.—The orchid family (*Orchidacæe*), to which the lady's-slippers belong, boasts of many beautiful, showy, and curious species, and the lady's-slipper is no exception. There are several other plants to which the name lady's-slipper has been applied, but one glance at the peculiar structure of the flowers in the species under consideration, as shown in the illustration (Pl. III, fig. 1), will enable anyone to recognize them as soon as seen.

The particular species of lady's-slipper under consideration in this article do not differ very materially from each other. Both are perennials, growing from

1 to about 2 feet in height, with rather large leaves and with yellow flowers more or less marked with purple, the main difference being that in *hirsutum* the flower is larger and pale yellow, while in *parviflorum* the flower is small, bright yellow, and perhaps more prominently striped and spotted with purple. The stem, leaves, and inside of corolla or lip are somewhat hairy in the large yellow lady's-slipper, but not in the small yellow lady's-slipper. These hairs are said to be irritating to some people, in whom they cause an eruption of the skin.

The leaves of the lady's-slipper vary in size from 2 to 6 inches in length and from 1 to 3 inches in width, and are broadly oval or elliptic, sharp pointed, with numerous parallel veins, and sheathing at the base, somewhat hairy in the large lady's-slipper. The solitary terminal flower, which appears from May to June, is very showy and curiously formed, the lip being the most prominent part. This lip looks like an inflated bag (1 to 2 inches long in the large lady's-slipper), pale yellow or bright yellow in color, variously striped and blotched with purple. The other parts of the flower are greenish or yellowish, with purple stripes, and the petals are usually twisted.

Description of rootstock.—The rootstock is of horizontal growth, crooked, fleshy, and with numerous wavy, fibrous roots. (Pl. III, fig. 1.) As found in commerce, the rootstocks are from 1 to 4 inches in length, about an eighth of an inch in thickness, dark brown, the upper surface showing numerous round cup-shaped scars, the remains of former annual stems, and the lower surface thickly covered with wavy, wiry, and brittle roots, the latter breaking off with a short, white fracture. The odor is rather heavy and disagreeable, and the taste is described as sweetish, bitter, and somewhat pungent.

Collection, prices, and uses.—Both rootstock and roots are used, and these should be collected in autumn, freed from dirt, and carefully dried in the shade. These beautiful plants are becoming rare in many localities. Sometimes such high-priced drugs as goldenseal and senega are found mixed with the lady's-slipper, but as these are more expensive than the lady's-slipper, it is not likely that they are included with fraudulent intent, and they can be readily distinguished. The prices paid to collectors of this root range from 32 to 35 cents a pound.

The principal use of lady's-slipper, which is official in the United States Pharmacopœia, is as an antispasmodic and nerve tonic, and it has been used for the same purposes as valerian.

CRAWLEY-ROOT.

Corallorhiza odontorhiza (Willd.) Nutt.

Other common names.—Corallorhiza, crawley, coralroot, small coralroot, small-flowered coralroot, late coralroot, dragon's-claw, chickentoe, turkey-claw, feverroot.

Habitat and range.—Rich, shady woods having an abundance of leaf mold produce this curious little plant. It may be found in such situations from Maine to Florida, westward to Michigan and Missouri.

Description of plant.—This peculiar native perennial, belonging to the orchid family (Orchidaceæ), is unlike most other plants, being leafless, and instead of a green stem it has a purplish brown, sheathed scape, somewhat swollen or bulbous at the base and bearing a clustered head of purplish flowers 2 to 4 inches long. It does not grow much taller than about a foot in height. (Fig. 4.) The flowers, 6 to 20 in a head, appear from July to September, and consist of lance-shaped sepals and petals striped with purple and a broad, whitish,

oval lip, generally marked with purple and narrowed at the base. The seed capsule is large, oblong, or somewhat globular.

Description of rootstock.—The rootstock of this plant is also curious, resembling in its formation a piece of coral (fig. 4), on account of which it is known by the name "coralroot." The other common names, such as chickentoe, turkey-claw, etc., all have reference to the form of the rootstock. As found in commerce, crawley-root consists of small, dark-brown wrinkled pieces, the larger ones branched like coral. The taste at first is sweetish, becoming afterwards slightly bitter. It has a peculiar odor when fresh, but when dry it is without odor.

Collection, prices, and uses.—Crawley-root should be collected in July or August. The price ranges from 20 to 50 cents a pound. Other species of *Corallorhiza* are sometimes collected and are said to probably possess similar properties. This root is said to be very effective for promoting perspiration, and it is also used as a sedative and in fever.

CANADA SNAKEROOT.

Asarum canadense L.

Other common names.—*Asarum*, wild ginger, Indian ginger, Vermont snakeroot, heart-snakeroot, southern snakeroot, black snakeroot, colt's-foot snakeroot, black snakeweed, broad-leaved asarabacca, false colt's-foot, cat's-foot, colieroot.

Habitat and range.—This inconspicuous little plant frequents rich woods or rich soil along roadsides from Canada south to North Carolina and Kansas.

Description of plant.—Canada snakeroot is a small, apparently stemless perennial, not more than 6 to 12 inches in height, and belongs to the birthwort family (*Aristolochiaceæ*). It usually has but two leaves, which are borne on slender, finely hairy stems; they are kidney shaped or heart shaped, thin, dark green above and paler green on the lower surface, strongly veined, and from 4 to 7 inches broad.

The solitary bell-shaped flower is of an unassuming dull brown or brownish purple, and this modest color, together with its position on the plant, renders it so inconspicuous as to escape the notice of the casual observer. It droops from a short, slender stalk produced between the two leaf stems and is almost hidden under the two leaves, growing so close to the ground that it is sometimes buried beneath old leaves, and sometimes the soil must be removed before the flower can be seen. It is bell shaped, woolly, the inside darker in color than the outside and of a satiny texture. The fruit which follows is in the form of a leathery 6-celled capsule. (Pl. III, fig. 2.)

Description of rootstock.—Canada snakeroot has a creeping, yellowish rootstock, slightly jointed, with thin rootlets produced from joints which occur about every half inch or so. (Pl. III, fig. 2.) In the drug trade the rootstock is usually found in pieces a few inches in length and about one-eighth of an inch in diameter. These are four-angled, crooked, brownish and wrinkled on the outside, whitish inside and showing a large central pith, hard and brittle, and breaking with a short fracture. The odor is fragrant and the taste spicy



FIG. 4.—Crawley-root (*Corallorhiza odontorhiza*). After Torrey's Flora of New York.

and aromatic, and has been said to be intermediate between ginger and serpentaria.

Collection, prices, and uses.—The aromatic root of Canada snakeroot is collected in autumn, and the price ranges from 10 to 15 cents a pound. It was reported as very scarce in the latter part of the summer of 1906. Canada snake-root, which was official in the United States Pharmacopœia from 1820 to 1880, is used as an aromatic, diaphoretic, and carminative.

SERPENTARIA.

- (1) *Aristolochia serpentaria* L. and (2) *Aristolochia reticulata* Nutt.

Pharmacopœial name.—Serpentaria.

Other common names.—(1) Virginia serpentaria, Virginia snakeroot, serpentary, snakeweed, pelican-flower, snagrel, sangrel, sangree-root: (2) Texas serpentaria, Texas snakeroot, Red River snakeroot.

Habitat and range.—Virginia serpentaria is found in rich woods from Connecticut to Michigan and southward, principally along the Alleghenies, and Texas serpentaria occurs in the Southwestern States, growing along river banks from Arkansas to Louisiana.

Description of Virginia serpentaria.—About midsummer the queerly shaped flowers of this native perennial are produced. They are very similar to those of the better known "Dutchman's-pipe," another species of this genus, which is quite extensively grown as an ornamental vine for covering porches and trellises. Virginia serpentaria and Texas serpentaria both belong to the birthwort family (Aristolochiaceæ). The Virginia serpentaria is nearly erect, the slender, wavy stem sparingly branched near the base, and usually growing to about a foot in height, sometimes, however, even reaching 3 feet. The leaves are thin, ovate, ovate lance shaped or oblong lance shaped, and usually heart shaped at the base; they are about $2\frac{1}{2}$ inches long and about 1 or $1\frac{1}{2}$ inches in width. The flowers are produced from near the base of the plant, similar to its near relative, the Canada snakeroot. They are solitary and terminal, borne on slender, scaly branches, dull brownish purple in color, and of a somewhat leathery texture; the calyx tube is curiously bent or contorted in the shape of the letter S. The fruit is a roundish 6-celled capsule, about half an inch in diameter, and containing numerous seeds. (Pl. III, fig. 3.)

Description of Texas serpentaria.—This species has a very wavy stem, with oval, heart-shaped, clasping leaves, which are rather thick and strongly reticulated or marked with a network of veins; hence the specific name *reticulata*. The entire plant is hairy, with numerous long, coarse hairs. The small, densely hairy purplish flowers are also produced from the base of the plant.

Description of rootstocks.—Serpentaria has a short rootstock with many thin, branching, fibrous roots. (Pl. III, fig. 3.) In the dried state it is thin and bent, the short remains of stems showing on the upper surface and the under surface having numerous thin roots about $\frac{1}{4}$ inches in length, all of a dull yellowish brown color, internally white. It has a very agreeable aromatic odor, somewhat like camphor, and the taste is described as warm, bitterish, and camphoraceous.

The Texas serpentaria has a larger rootstock, with fewer roots less interlaced than the Virginia serpentaria.

Collection, prices, and uses.—The roots of serpentaria are collected in autumn. Various other roots are sometimes mixed with serpentaria, but as they are mostly high-priced drugs, such as goldenseal, pinkroot, senega, and ginseng, their presence in a lot of serpentaria is probably accidental, due simply to proximity

of growth of these plants. Abscess-root (*Polemonium reptans* L.) is another root with which serpentaria is often adulterated. It is very similar to serpentaria, except that it is nearly white. The price of serpentaria ranges from 35 to 40 cents a pound.

Serpentaria is used for its stimulant, tonic, and diaphoretic properties. Both species are official in the United States Pharmacopœia.

YELLOW DOCK.

Rumex crispus L.

Other common names.—Rumex, curled dock, narrow dock, sour dock. (Fig. 5.)

Habitat and range.—This troublesome weed, introduced from Europe, is now found throughout the United States, occurring in cultivated as well as in waste ground, among rubbish heaps, and along roadsides.

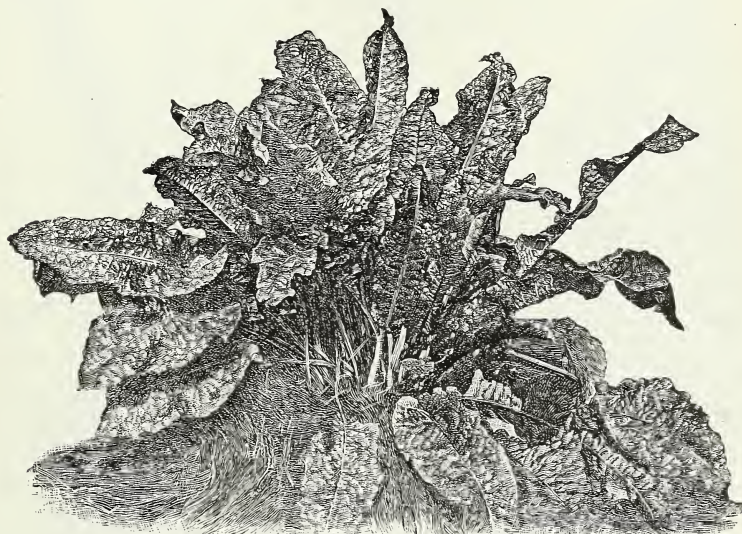


FIG. 5.—Yellow dock (*Rumex crispus*), first year's growth.

Description of plant.—Yellow dock is a perennial plant belonging to the buckwheat family (Polygonaceæ), and has a deep, spindle-shaped root, from which arises an erect, angular, and furrowed stem, attaining a height of from 2 to 4 feet. The stem is branched near the top and leafy, bearing numerous long dense clusters formed by drooping groups of inconspicuous green flowers placed in circles around the stem. The flowers are produced from June to August, and the fruits which follow are in the form of small triangular nuts, like the grain of buckwheat, to which family the dock belongs. So long as the fruits are green and immature they can scarcely be distinguished from the flowers, but as they ripen the clusters take on a rusty-brown color. The leaves of the yellow dock are lance shaped, acute, with the margins strongly waved and crisped, the lower long-stalked leaves being blunt or heart shaped at the base and from 6 to 8 inches in length, while those nearer the top are narrower and shorter, only 3 to 6 inches in length, short stemmed or stemless.

The broad-leaved dock (*Rumex obtusifolius* L.), known also as bitter dock, common dock, blunt-leaved dock, and butter-dock, is a very common weed found

in waste places from the New England States to Oregon and south to Florida and Texas. It grows to about the same height as the yellow dock, to which it



FIG. 6.—Broad-leaved dock (*Rumex obtusifolius*), leaf, fruiting spike, and root.

bears a close resemblance, differing principally in its more robust habit of growth. The stem is stouter than in yellow dock, and the leaves, which like-

wise are wavy along the margin, are much broader and longer. The green flowers appear from June to August and are in rather long, open clusters, the groups rather loose and far apart. (Fig. 6.)

Description of roots.—Yellow dock root is large and fleshy, usually from 8 to 12 inches long, tapering or spindle shaped, with few or no rootlets. When dry it is usually twisted and prominently wrinkled, the rather thick, dark, reddish brown bark marked with small scars. The inside of the root is whitish at first, becoming yellowish. The fracture is short, but shows some splintery fibers. The root, as it occurs in commerce, is either entire or occasionally split lengthwise.

The darker colored root of the broad-leaved dock has a number of smaller branches near the crown and more rootlets. (Fig. 6.) Dock roots have but a very faint odor and a bitter, astringent taste.

Collection, prices, and uses.—The roots should be collected in late summer or autumn, after the fruiting tops have turned brown, then washed, either left entire or split lengthwise into halves or quarters, and carefully dried. Yellow dock root ranges from 4 to 6 cents a pound.

In the United States Pharmacopœia of 1890 "the roots of *Rumex crispus* and of some other species of *Rumex*" were official, and both of the above-named species are used, but the yellow dock (*Rumex crispus*) is the species most commonly employed in medicine. The docks are largely used for purifying the blood and in the treatment of skin diseases.

The young root leaves of both of the species mentioned are sometimes used in spring as pot herbs.

POKEWEED.

Phytolacca decandra L.^a

Synonym.—*Phytolacca americana* L.^a

Pharmacopœial name.—*Phytolacca*.

Other common names.—Poke, pigeon-berry, garget, scoke, pocan, coakum, Virginian poke, inkberry, red inkberry, American nightshade, cancer-jalap, redweed.

Habitat and range.—Pokeweed, a common, familiar, native weed, is found in rich, moist soil along fence rows, fields, and uncultivated land from the New England States to Minnesota south to Florida and Texas.

Description of plant.—In Europe, where pokeweed has become naturalized from this country, it is regarded as an ornamental garden plant, and, indeed, it is very showy and attractive with its reddish purple stems, rich green foliage, and clusters of white flowers and dark-purple berries.

The stout, smooth stems, arising from a very large perennial root, attain a height of from 3 to 9 feet, and are erect and branched, green at first, then reddish. If a piece of the stem is examined, the pith will be seen to be divided into disk-shaped parts with hollow spaces between them. The smooth leaves are borne on short stems and are about 5 inches long and 2 to 3 inches wide, ovate or ovate oblong, acute at the apex, and the margins entire. The long-stalked clusters of whitish flowers, which appear from July to September, are from 3 to 4 inches in length, the flowers numerous and borne on reddish stems. In about two months the berries will have matured and assumed a rich dark-purple color.

^a *Phytolacca americana* L. by right of priority should be accepted, but *P. decandra* L. is used in conformity with the Pharmacopœia.

These smooth and shining purple berries are globular, flattened at both ends, and contain black seeds embedded in a rich crimson juice. (Fig. 7.) This plant belongs to the pokeweed family (*Phytolaccaceæ*).



FIG. 7.—Pokeweed (*Phytolacca decandra*), flowering and fruiting branch.

Description of root.—Pokeweed has a very thick, long, fleshy root, conical in shape and branched (fig. 8), very much resembling that of horseradish, and poisonous. In commerce it usually occurs in transverse or lengthwise slices, the outside a yellowish brown and finely wrinkled lengthwise, and thickly encircled with lighter colored ridges. It breaks with a fibrous fracture and is yellowish gray within. The transverse slices show many concentric rings. There is a slight odor and the taste is sweetish and acrid. The root when powdered causes sneezing.



FIG. 8.—Pokeweed root.

Collection, prices, and uses.—The root of the pokeweed, which is official in the United States Pharmacopœia, is collected in the latter part of autumn, thoroughly cleaned, cut into transverse or lengthwise slices, and carefully dried. It brings from 2½ to 4 cents a pound.

The root is used for its alterative properties in treating various diseases of the skin and blood, and in certain cases in relieving pain and allaying inflammation. It also acts upon the bowels and causes vomiting.

The berries when fully matured are also used in medicine.

The young and tender shoots of the pokeweed are eaten in spring, like asparagus, but bad results may follow if they are not thoroughly cooked or if they are cut too close to the root.

SOAPWORT.

Saponaria officinalis L.

Other common names.—Saponaria, saponary, common soapwort, bouncing-bet, soaproot, bruisewort, Boston pink, chimney-pink, crow-soap, hedge-pink, old-maid's-pink, fuller's-herb, lady-by-the-gate, London-pride, latherwort, mock-gilliflower, scourwort, sheepweed, sweet-betty, wild sweet-william, woods-phlox, world's-wonder.

Habitat and range.—By one or another of its many common names this plant, naturalized from Europe, is known almost everywhere, occurring along roadsides and in waste places.

Description of plant.—Soapwort is a rather pretty herbaceous perennial, 1 to 2 feet high, and belonging to the pink family (Silenaceæ). Its smooth, stout, and erect stem is leafy and only sparingly branched, the leaves ovate, 2 to 3 inches long, smooth, prominently ribbed, and pointed at the apex. The bright-looking, crowded clusters of pink (or in shady localities whitish) flowers appear from about June until far along in September. The five petals of the corolla are furnished with long "claws," or, in other words, they are narrowly lengthened toward the base and inserted within the tubular and pale-green calyx. The seed capsule is oblong and one-celled. (Pl. III, fig. 4.)

Description of root.—Soapwort spreads by means of its stolons, or underground runners. But the roots, which are rather long, are the parts employed in medicine. These are cylindrical, tapering toward the apex, more or less branched, and wrinkled lengthwise. (Pl. III, fig. 4.) The whitish wood is covered with a brownish red, rather thick bark, and the root breaks with a short, smooth fracture. It is at first sweetish, bitter, and mucilaginous, followed by a persistently acrid taste, but it has no odor.

Collection, prices, and uses.—As already indicated, the roots, without the runners, should be collected either in spring or autumn. With water they form a lather, like soap, whence the common names soapwort, soaproot, latherwort, etc., are derived. The price ranges from 5 to 10 cents a pound. The roots are employed in medicine for their tonic, alterative, and diaphoretic properties. The leaves are also used.

GOLDENSEAL.

Hydrastis canadensis L.

Pharmacopœial name.—Hydrastis.

Other common names.—Yellowroot, yellow puccoon, orange-root, yellow Indian-paint, turmeric-root, Indian turmeric, Ohio curcuma, ground-raspberry, eyeroot, eye-balm, yellow-eye, jaundice-root, Indian-dye.

Habitat and range.—This native forest plant occurs in patches in high, open woods, and usually on hillsides or bluffs affording natural drainage, from southern New York to Minnesota and western Ontario, south to Georgia and Missouri.

Goldenseal is now becoming scarce throughout its range. Ohio, Indiana, Kentucky, and West Virginia have been the greatest goldenseal-producing States.

Description of plant.—Goldenseal is a perennial plant belonging to the same family as the buttercup, namely, the crowfoot family (Ranunculaceæ). It has a thick yellow rootstock, which sends up an erect hairy stem about 1 foot in height, surrounded at the base by 2 or 3 yellowish scales. The yellow color of the roots and scales extends up the stem so far as it is covered by soil, while the portion of the stem above ground has a purplish color. The stem, which

has only two leaves, seems to fork at the top, one branch bearing a large leaf and the other a smaller one and a flower. A third leaf, which is much smaller than the other two and stemless, is occasionally produced. The leaves are palmately 5 to 9 lobed, the lobes broad, acute, sharply and unequally toothed; they are prominently veined on the lower surface, and at flowering time, when they are very much wrinkled, they are only partially developed, but they continue to expand until they are from 6 to 8 inches in diameter, becoming thinner in texture and smoother. The upper leaf subtends or incloses the flower bud.



FIG. 9.—Goldenseal (*Hydrastis canadensis*), flowering plant and fruit.

nauseating odor, is bright yellow, both internally and externally, with fibrous yellow rootlets produced from the sides. It is from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches in length, from one-fourth to three-fourths of an inch in thickness, and contains a large amount of yellow juice. (Fig. 10.)

In the dried state the rootstock is crooked, knotty, and wrinkled, from 1 to 2 inches in length, and from one-eighth to one-third of an inch in diameter. It is of a dull-brown color on the outside and breaks with a clean, short, resinous fracture, showing a lemon-yellow color inside. After the rootstock has been kept for some time it will become greenish yellow or brown internally and

The greenish white flower appears about April or May, but it is of short duration, lasting only five or six days. It is less than half an inch in diameter and, instead of petals, has three small petal-like sepals, which fall away as soon as the flower expands, leaving only the numerous stamens (as many as 40 or 50), in the center of which are about a dozen pistils, which finally develop into a round, fleshy, berry-like head which ripens in July or August. The fruit when ripe turns a bright red and resembles a large raspberry, whence the common name "ground-raspberry" is derived. It contains from 10 to 20 small, black, shining, hard seeds. (Fig. 9.)

Description of rootstock.—The fresh rootstock of goldenseal, which has a rank,

its quality impaired. The cup-like depressions or stem scars on the upper surface of the rootstock resemble the imprint of a seal, whence the most popular name of the plant, goldenseal, is derived. The rootstock as found in commerce is almost bare, the fibrous rootlets, which in drying become very wiry and brittle, breaking off readily and leaving only small protuberances.

The odor of the dried rootstock, while not so pronounced as in the fresh material, is peculiar, narcotic, and disagreeable. The taste is exceedingly bitter, and when the rootstock is chewed there is a persistent acidity, which causes an abundant flow of saliva.

Collection, prices, and uses.—The root should be collected in autumn after the seeds have ripened, freed from soil, and carefully dried. After a dry season goldenseal dies down soon after the fruit is mature, so that it often happens that by the end of September not a trace of the plant remains above ground; but if the season has been moist, the plant sometimes persists to the beginning of winter. The price of goldenseal ranges from \$1 to \$1.50 a pound.

Goldenseal, which is official in the United States Pharmacopœia, is a useful drug in digestive disorders and in certain catarrhal affections of the mucous membranes, in the latter instance being administered both internally and locally.

Cultivation.—Once so abundant in certain parts of the country, especially in the Ohio Valley, goldenseal is now becoming scarce throughout its range, and in consequence of the increased demand for the root, both at home and abroad, its cultivation must sooner or later be more generally undertaken in order to satisfy the needs of medicine. In some parts of the country the cultivation of goldenseal is already under way.

The first thing to be considered in growing this plant is to furnish it, as nearly as possible, the conditions to which it has been accustomed in its native forest home. This calls for a well-drained soil, rich in humus, and partially shaded. Goldenseal stands transplanting well, and the easiest way to propagate it is to bring the plants in from the forest and transplant them to a properly prepared location, or to collect the rootstocks and to cut them into as many pieces as there are buds, planting these pieces in a deep, loose, well-prepared soil, and mulching, adding new mulch each year to renew the humus. With such a soil the cultivation of goldenseal is simple, and it will be necessary chiefly to keep down the weeds.

The plants may be grown in rows 1 foot apart and 6 inches apart in the row, or they may be grown in beds 4 to 8 feet wide, with walks between. Artificial shade will be necessary, and this is supplied by the erection of lath sheds. The time required to obtain a marketable crop is from two to three years.

Detailed information regarding the experiments made by the Department will be found in another publication.^a

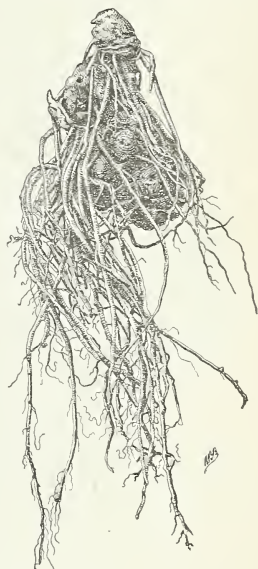


FIG. 10.—Goldenseal rootstock.

^a Bulletin 51, Part VI, Bureau of Plant Industry, "Goldenseal."

GOLDTHREAD.

Coptis trifolia (L.) Salisb.

Other common names.—Coptis, cankerroot, mouthroot, yellowroot.

Habitat and range.—This pretty little perennial is native in damp, mossy woods and bogs from Canada and Alaska south to Maryland and Minnesota. It is most common in the New England States, northern New York and Michigan, and in Canada, where it frequents the dark sphagnum swamps, cold bogs, and the shade of dense forests of cedars, pines, and other evergreens.

Description of plant.—Anyone familiar with this attractive little plant will agree that it is well named. The roots of goldthread, running not far beneath the surface of the ground, are indeed like so many tangled threads of gold. The plant in the general appearance of its leaves and flowers very closely resembles the strawberry plant. It is of low growth, only 3 to 6 inches in height, and belongs to the crowfoot family (Ranunculaceæ). The leaves are all basal, and are borne on long, slender stems; they are evergreen, dark green and shining on the upper surface and lighter green beneath, divided into three parts, which are prominently veined and toothed. A single small, white, star-shaped flower

is borne at the ends of the flowering stalks, appearing from May to August. (Fig. 11.) The 5 to 7 sepals or lobes of the calyx are white and like petals, and the petals of the corolla, 5 to 7 in number, are smaller, club shaped, and yellow at the base. The seed pods are stalked, oblong, compressed, spreading, tipped with the persistent style, and containing small black seeds.



FIG. 11.—Goldthread (*Coptis trifolia*). After Lloyd's Drugs and Medicines of North America.

Goldthread has a long, slender, creeping root, which is much branched and frequently matted. (Fig. 11.) The color of these roots is a bright golden yellow. As found in the stores, goldthread consists usually of tangled masses of these golden-yellow roots, mixed with the leaves and stems of the plant, but the root is the part prescribed for use. The root is bitter and has no odor.

Collection, prices, and uses.—The time for collecting goldthread is in autumn. After removing the covering of dead leaves and moss, the creeping yellow roots of goldthread will be seen very close to the surface of the ground, from which they can be very easily pulled. They should, of course, be carefully dried. As already stated, although the roots and rootlets are the parts to be used, the commercial article is freely mixed with the leaves and stems of the plant. Evidences of the pine-woods home of this plant, in the form of pine needles and bits of moss, are often seen in the goldthread received for market. Goldthread brings from 60 to 70 cents a pound.

The Indians and early white settlers used this little root as a remedy for various forms of ulcerated and sore mouth, and it is still used as a wash or gargle for affections of this sort. It is also employed as a bitter tonic.

Goldthread was official in the United States Pharmacopœia from 1820 to 1880.

BLACK COHOSH.

Cimicifuga racemosa (L.) Nutt.*Synonymy*.—*Actaea racemosa* L.*Pharmacopœial name*.—*Cimicifuga*.*Other common names*.—Black snakeroot, bugbane, bugwort, rattle-snakeroot, rattleroot, rattleweed, rattletop, richweed, squawroot.*Habitat and range*.—Although preferring the shade of rich woods, black cohosh will grow occasionally in sunny situations in fence corners and woodland pastures. It is most abundant in the Ohio Valley, but it occurs from Maine to Wisconsin, south along the Allegheny Mountains to Georgia, and westward to Missouri.*Description of plant*.—Rising to a height of 3 to 8 feet, the showy, delicate-flowered spikes of the black cohosh tower above most of the other woodland flowers, making it a conspicuous plant in the woods and one that can be easily recognized.Black cohosh is an indigenous perennial plant belonging to the same family as the goldenseal, namely, the crowfoot family (*Ranunculaceæ*). The tall stem, sometimes 8 feet in height, is rather slender and leafy, the leaves consisting of three leaflets, which are again divided into three. The leaf-FIG. 12.—Black cohosh (*Cimicifuga racemosa*), leaves, flowering spikes, and rootstock.

lets are about 2 inches long, ovate, sharp pointed at the apex, thin and smooth, variously lobed, and the margins sharply toothed. The graceful, spikelike terminal cluster of flowers, which is produced from June to August, is from 6 inches to 2 feet in length. (Fig. 12.) Attractive as these flower clusters are to the eye, they generally do not prove attractive very long to those who may gather them for their beauty, since the flowers emit an offensive odor, which accounts for some of the common names applied to this plant, namely, bugbane and bugwort, it having been thought that this odor was efficacious in driving away bugs. The flowers do not all open at one time, and thus there may be seen buds, blossoms, and seed pods on one spike. The buds are white and globular, and as

they expand in flower there is practically nothing to the flower but very numerous white stamens and the pistil, but the stamens spread out around the pistil in such a manner as to give to the spike a somewhat feathery or fluffy appearance which is very attractive. The seed pods are dry, thick and leathery, ribbed, and about one-fourth of an inch long, with a small beak at the end. The smooth brown seeds are inclosed within the pods in two rows. Anyone going through the woods in winter may find the seed pods, full of seeds, still clinging to the dry, dead stalk, and the rattling of the seeds in the pods as the wind passes over them has given rise to the common names rattle-snakeroot (not "rattlesnake"-root), rattleweed, rattletop, and rattleroot.

Description of rootstock.—The rootstock (fig. 12) is large, horizontal, and knotty or rough and irregular in appearance. The upper surface of the rootstock is covered with numerous round scars and stumps, the remains of former leaf stems, and on the fresh rootstocks may be seen the young, pinkish white buds which are to furnish the next season's growth. From the lower part of the rootstock long, fleshy roots are produced. The fresh rootstock is very dark reddish brown on the outside, white within, showing a large central pith from which radiate rays of a woody texture, and on breaking the larger roots also the woody rays will be seen in the form of a cross. On drying, the rootstock becomes hard and turns much darker, both internally and externally, but the peculiar cross formation of the woody rays in both rootstock and roots, being lighter in color, is plainly seen without the aid of a magnifying glass. The roots in drying become wiry and brittle and break off very readily. Black cohosh has a heavy odor and a bitter, acrid taste.

Collection, prices, and uses.—The root should be collected after the fruit has ripened, usually in September. The price ranges from 2 to 3 cents a pound.

The Indians had long regarded black cohosh as a valuable medicinal plant, not only for the treatment of snake bites, but it was also a very popular remedy among their women, and it is to-day considered of value as an alterative, emmenagogue, and sedative, and is recognized as official in the United States Pharmacopœia.

OREGON GRAPE.

Berberis aquifolium Pursh.

Pharmacopœial name.—*Berberis*.

Other common names.—Rocky Mountain grape, holly-leaved barberry, California barberry, trailing Mahonia.

Habitat and range.—This shrub is native in woods in rich soil among rocks from Colorado to the Pacific Ocean, but it is especially abundant in Oregon and northern California.

Description of plant.—Oregon grape is a low-growing shrub, resembling somewhat the familiar Christmas holly of the Eastern States, and, in fact, was first designated as "mountain-holly" by members of the Lewis and Clark expedition on their way through the western country. It belongs to the barberry family (Berberidaceæ), and grows about 2 to 6 feet in height, the branches sometimes trailing. The leaves consist of from 5 to 9 leaflets, borne in pairs, with an odd leaflet at the summit. They are from 2 to 3 inches long and about 1 inch wide, evergreen, thick, leathery, oblong or oblong ovate in outline, smooth and shining above, the margins provided with thorny spines or teeth. The numerous small yellow flowers appear in April or May and are borne in erect, clustered heads. The fruit consists of a cluster of blue or bluish purple berries, having a pleasant taste, and each containing from three to nine seeds. (Pl. IV, fig. 1.)

Other species.—While *Berberis aquifolium* is generally designated as the source of Oregon grape root, other species of *Berberis* are met with in the market under the name grape root, and their use is sanctioned by the United States Pharmacopœia.

The species most commonly collected with *Berberis aquifolium* is *B. nervosa* Pursh, which is also found in woods from California northward to Oregon and Washington. This is 9 to 16 inches in height, with a conspicuously jointed stem and 11 to 17 bright-green leaflets.

Another species of *Berberis*, *B. pinnata* Lag., attains a height of from a few inches to 5 feet, with from 5 to 9, but sometimes more, leaflets, which are shining above and paler beneath. This resembles *aquifolium* very closely and is often mistaken for it, but it is said that it has not been used by the medical profession, unless in local practice.^a The root also is about the same size as that of *aquifolium*, while the root of *nervosa* is smaller.

Some works speak of *Berberis repens* Lindl. as another species often collected with *aquifolium*, but in the latest botanical manuals no such species is recognized, *B. repens* being given simply as a synonym for *B. aquifolium*.

Description of rootstock.—The rootstock and roots of Oregon grape are more or less knotty, in irregular pieces of varying lengths, and about an inch or less in diameter, with brownish bark and hard and tough yellow wood, showing a small pith and narrow rays. Oregon grape root has a very bitter taste and very slight odor.

Collection, prices, and uses.—Oregon grape root is collected in autumn and brings from 10 to 12 cents a pound. The bark should *not* be removed from the rootstocks, as the Pharmacopœia directs that such roots be rejected.

This root has long been used in domestic practice throughout the West as a tonic and blood purifier, and is now official in the United States Pharmacopœia.

The berries are used in making preserves and cooling drinks.

BLUE COHOSH.

Caulophyllum thalictroides (L.) Michx.

Other common names.—Caulophyllum, pappoose-root, squawroot, blueberry-root, blue ginseng, yellow ginseng. (Pl. IV. fig. 2.)

Habitat and range.—Blue cohosh is found in the deep rich loam of shady woods from New Brunswick to South Carolina, westward to Nebraska, being abundant especially throughout the Allegheny Mountain region.

Description of plant.—This member of the barberry family (Berberidaceæ) is a perennial herb, 1 to 3 feet in height, and indigenous to this country. It bears at the top one large, almost stemless leaf, which is tritermately compound—that is, the main leaf stem divides into three stems, which again divide into threes, and each division bears three leaflets. Sometimes there is a smaller leaf, but similar to the other, at the base of the flowering branch. The leaflets are thin in texture, oval, oblong, or obovate, and 3 to 5 lobed.

In the early stage of its growth this plant is covered with a sort of bluish green bloom, but it gradually loses this and becomes smooth. The flowers are borne in a small terminal panicle or head, and are small and greenish yellow. They appear from April to May, while the leaf is still small. The globular seeds, which ripen about August, are borne on stout stalks in membranous capsules and resemble dark-blue berries.

^a King's American Dispensatory, Vol. I. 1898, from Berberidaceæ, by C. G. and J. U. Lloyd, 1878.

Description of rootstock.—The thick crooked rootstock of blue cohosh is almost concealed by the mass of matted roots which surrounds it. There are numerous cup-shaped scars and small branches on the upper surface of the rootstock, while the lower surface gives off numerous long, crooked, matted roots. Some of the scars are depressed below the surface of the rootstock, while others are raised above it. The outside is brownish and the inside tough and woody. Blue cohosh possesses a slight odor and a sweetish, somewhat bitter and acrid taste. In the powdered state it causes sneezing.

Collection, prices, and uses.—The root is dug in the fall. Very often the roots of goldenseal or twinleaf are found mixed with those of blue cohosh. The price of blue cohosh root ranges from 2½ to 4 cents a pound.

Blue cohosh, official in the United States Pharmacopœia for 1890, is used as a demulcent, antispasmodic, emmenagogue, and diuretic.

TWINLEAF.

Jeffersonia diphylla (L.) Pers.

Other common names.—Jeffersonia, rheumatism-root, helmetpod, ground-squirrel pea, yellowroot.

Habitat and range.—Twinleaf inhabits rich shady woods from New York to Virginia and westward to Wisconsin.

Description of plant.—This native herbaceous perennial is only about 6 to 8 inches in height when in flower. At the fruiting stage it is frequently 18 inches in height. It is one of our early spring plants, and its white flower, resembling that of bloodroot, is produced as early as April.



FIG. 13.—Twinleaf (*Jeffersonia diphylla*), plant and seed capsule. (After Britton and Brown, Illustrated Flora.)

The long-stemmed, smooth leaves, produced in pairs and arising from the base of the plant, are rather oddly formed. They are about 3 to 6 inches long, 2 to 4 inches wide, heart shaped or kidney shaped, but parted lengthwise into two lobes or divisions, really giving the appearance of two leaves; hence the common name "twinleaf." The flower with its eight oblong, spreading white petals measures about 1 inch across, and is borne at the summit of a slender stalk arising from the root. The many-seeded capsule is about 1 inch long, leathery, somewhat pear shaped, and opening halfway around near the top, the upper part forming a sort of lid. (Fig. 13.) Twinleaf belongs to the barberry family (Berberidaceæ).

Description of rootstock.—Twinleaf has a horizontal rootstock, with many fibrous, much-matted roots, and is very similar to that of blue cohosh, but not so long. It is thick, knotty, yellowish brown externally, with a resinous bark, and internally yellowish. The inner portion is nearly tasteless, but the bark has a bitter and acrid taste.

Collection, prices, and uses.—The rootstock is collected in autumn, and is used as a diuretic, alterative, antispasmodic, and a stimulating diaphoretic. Large

doses are said to be emetic and smaller doses tonic and expectorant. The price paid for twinleaf root ranges from about 5 to 7 cents a pound.

MAY-APPLE.

Podophyllum peltatum L.

Pharmacopœial name.—Podophyllum.

Other common names.—Mandrake, wild mandrake, American mandrake, wild lemon, ground-lemon, hog-apple, devil's-apple, Indian apple, raccoon-berry, duck's-foot, umbrella-plant, vegetable calomel.

Habitat and range.—The May-apple is an indigenous plant, found in low woods, usually growing in patches, from western Quebec to Minnesota, south to Florida and Texas.

Description of plant.—A patch of May-apple can be distinguished from afar, the smooth, dark-green foliage and close and even stand making it a conspicuous feature of the woodland vegetation.

May-apple is a perennial plant, and belongs to the barberry family (Berberidaceæ). It is erect, and grows about 1 foot in height. The leaves are only two in number, circular in outline, but with five to seven deep lobes, the lobes 2 cleft, and toothed at the apex; they are dark



FIG. 14.—May-apple (*Podophyllum peltatum*), upper portion of plant with flower, and rootstock.

green above, the lower surface lighter green and somewhat hairy or smooth, sometimes 1 foot in diameter, and borne on long leafstalks which are fixed to the center of the leaf, giving it an umbrella-like appearance. The waxy-white, solitary flower, sometimes 2 inches in diameter, appears in May, nodding on its short stout stalk, generally right between the two large umbrella-like leaves, which shade it and hide it from view. (Fig. 14.) The fruit which follows is lemon shaped, at first green, then yellow, about 2 inches in length, and edible, although when eaten immoderately it is known to have produced bad effects.

In a patch of May-apple plants there are always a number of sterile or flowerless stalks, which bear leaves similar to those of the flowering plants.

Description of rootstock.—The horizontally creeping rootstock of May-apple (fig. 14), when taken from the ground, is from 1 to 6 feet or more in length, flexible, smooth, and round, dark brown on the outside and whitish and

fleshy within; at intervals of a few inches are thickened joints, on the upper surface of which are round stem scars and on the lower side a tuft of rather stout roots. Sometimes the rootstock bears lateral branches. The dried rootstock, as it occurs in the stores, is in irregular, somewhat cylindrical pieces, smooth or somewhat wrinkled, yellowish brown or dark brown externally, whitish to pale brown internally, breaking with a short, sharp fracture, the surface of which is mealy. The odor is slight and the taste at first sweetish, becoming very bitter and acrid.

Collection, prices, and uses.—The proper time for collecting the rootstock is in the latter half of September or in October. The price paid for May-apple root ranges from 3 to 6 cents a pound.

May-apple root, which is recognized as official in the United States Pharmacopœia, is an active cathartic, and was known as such to the Indians.

CANADA MOONSEED.

Menispermum canadense L.

Other common names.—Menispermum, yellow parilla, Texas sarsaparilla, yellow sarsaparilla, vine-maple. (Pl. IV, fig. 3.)

Habitat and range.—Canada moonseed is usually found along streams in woods, climbing over bushes, its range extending from Canada to Georgia and Arkansas.

Description of plant.—This native perennial woody climber reaches a length of from 6 to 12 feet, the round, rather slender stem bearing very broad, slender-stalked leaves. These leaves are from 4 to 8 inches wide, smooth and green on the upper surface and paler beneath, roundish in outline and entire, or sometimes lobed and resembling the leaves of some of our maples, whence the common name "vine-maple" is probably derived. The bases of the leaves are generally heart shaped and the apex pointed or blunt. In July the loose clusters of small yellowish or greenish white flowers are produced, followed in September by bunches of black one-seeded fruit, covered with a "bloom" and very much resembling grapes. Canada moonseed belongs to the moonseed family (Menispermaceæ).

Description of rootstock.—The rootstock and roots are employed in medicine. In the stores it will be found in long, straight pieces, sometimes 3 feet in length, only about one-fourth of an inch in thickness, yellowish brown or grayish brown, finely wrinkled lengthwise, and giving off fine, hairlike, branched, brownish roots from joints which occur every inch or so. The inside shows a distinct white pith of variable thickness and a yellowish white wood with broad, porous wood rays, the whole breaking with a tough, woody fracture. It has practically no odor, but a bitter taste.

Collection, prices, and uses.—Canada moonseed is collected in autumn, and brings from 4 to 8 cents a pound. It is used as a tonic, alterative, and diuretic, and was official in the United States Pharmacopœia for 1890.

BLOODROOT.

Sanguinaria canadensis L.

Pharmacopœial name.—Sanguinaria.

Other common names.—Redroot, red puccoon, red Indian-paint, puccoon-root, coonroot, white puccoon, pauson, snakebite, sweet-slumber, tetterwort, turmeric.

Habitat and range.—Bloodroot is found in rich, open woods from Canada south to Florida and west to Arkansas and Nebraska.

Description of plant.—This indigenous plant is among the earliest of our spring flowers, the waxy-white blossom, enfolded by the grayish green leaf, usually making its appearance early in April. The stem and root contain a blood-red juice. Bloodroot is a perennial, and belongs to the same family as the opium poppy, the Papaveraceæ. Each bud on the thick, horizontal rootstock produces but a single leaf and a flowering scape, reaching about 6 inches in height (fig. 15). The plant is smooth, and both stem and leaves, especially when young, present a grayish green appearance, being covered with a "bloom" such as is found on some fruits. The leaves are palmately 5 to 9 lobed, the lobes either cleft at the apex or having a wavy margin, and are borne on leaf stems about 6 to 14 inches long. After the plants have ceased flowering the leaves, at first only 3 inches long and 4 to 5 inches broad, continue to expand until they are about 4 to 7 inches long and 6 to 12 inches broad. The under side of the leaf is paler than the upper side and shows prominent veins. The flower measures about 1 inch across, is white, rather waxlike in appearance, with numerous golden-yellow stamens in the center. The petals soon fall off, and the oblong, narrow seed pod develops, attaining a length of about an inch.

Description of rootstock.—When dug out of the ground bloodroot is rather thick, round, and fleshy, slightly curved at the ends, and contains a quantity of blood-red juice. It is from 1 to 4 inches in length, from $\frac{1}{2}$ to 1 inch in thickness, externally reddish brown, internally a bright-red blood color, and produces many thick, orange-colored rootlets. (Fig. 15.)

The rootstock shrinks considerably in drying, the outside turning dark brown and the inside orange-red or yellowish with numerous small red dots, and it breaks with a short, sharp fracture. It has but a slight odor, and the taste is bitter and acrid and very persistent. The powdered root causes sneezing.

Collection, prices, and uses.—The rootstock should be collected in autumn, after the leaves have died, and after curing it should be stored in a dry place, as it rapidly deteriorates if allowed to become moist. Age also impairs its activity. The price paid to collectors for this root ranges from about 5 to 10 cents a pound.

Bloodroot was well known to the American Indians, who used the red juice as a dye for skins and baskets and for painting their faces and bodies. It is official in the United States Pharmacopœia, and is used as a tonic, alterative, stimulant, and emetic.

HYDRANGEA.

Hydrangea arborescens L.

Other common names.—Wild hydrangea, seven-barks.

Habitat and range.—Hydrangea frequents rocky river banks and ravines from the southern part of New York to Florida, and westward to Iowa and Missouri, being especially abundant in the valley of the Delaware and southward.

Description of plant.—Hydrangea is an indigenous shrub, 5 to 6 feet or more in height, with weak twigs, slender leaf stems and thin leaves. It belongs to the hydrangea family (Hydrangeaceæ). The leaves are oval or sometimes heart



FIG. 15.—Bloodroot (*San. guinaria canadensis*), flowering plant with rootstock.

shaped. 3 to 6 inches long, sharply toothed, green on both sides, the upper smooth and the lower sometimes hairy. The shrub is in flower from June to July, producing loose, branching, terminal heads of small, greenish white flowers, followed by membranous, usually 2-celled capsules, which contain numerous seeds. (Pl. IV, fig. 4.) Sometimes hydrangea will flower a second time, early in fall.

A peculiar characteristic of this shrub, and one that has given rise to the common name "seven-barks," is the peeling off of the stem bark, which comes off in several successive layers of thin, different colored bark.

Description of root.—The root is roughly branched and when first taken from the ground is very juicy, but after drying it becomes hard. The smooth white and tough wood is covered with a thin, pale-yellow or light-brown bark, which readily scales off. The wood is tasteless, but the bark has a pleasant aromatic taste, becoming somewhat pungent.

Collection, prices, and uses.—Hydrangea root is collected in autumn, and as it becomes very tough after drying and difficult to bruise it is best to cut the root in short transverse pieces while it is fresh and still juicy and dry it in this way. The price ranges from 2 to 7 cents a pound.

Hydrangea has diuretic properties and is said to have been much used by the Cherokees and early settlers in calculous complaints.

INDIAN-PHYSIC.

Porteranthus trifoliatus (L.) Britton.

Synonym.—*Gillenia trifoliata* Moench.

Other common names.—*Gillenia*, bowman's-root, false ipecac, western dropwort, Indian-hippo.

Habitat and range.—Indian-physic is native in rich woods from New York to Michigan, south to Georgia and Missouri.

Description of plant.—The reddish stems of this slender, graceful perennial of the rose family (Rosaceæ) are about 2 to 3 feet high, several erect and branched stems being produced from the same root. The leaves are almost stemless and trifoliolate; that is, composed of three leaflets. They are ovate or lanceolate, 2 to 3 inches long, narrowed at the base, smooth, and toothed. The nodding, white or pinkish flowers are few, produced in loose terminal clusters from May to July. (Pl. V, fig. 1.) The five petals are long, narrowed or tapering toward the base, white or pinkish, and inserted in the tubular, somewhat bell-shaped, red-tinged calyx. The seed pods are slightly hairy.

At the base of the leaf stems are small leaflike parts, called stipules, which in this species are very small, linear, and entire. In the following species, which is very similar to *trifoliatus* and collected with it, the stipules, however, are so much larger that they form a prominent character, which has given rise to its specific name, *stipulatus*.

Porteranthus stipulatus (Muhl.) Britton (*Syn. Gillenia stipulacea* Nutt.) is found in similar situations as *P. trifoliatus*, but generally farther west, its range extending from western New York to Indiana and Kansas, south to Alabama, Louisiana, and Indian Territory. The general appearance of this plant is very similar to that of *P. trifoliatus*. It grows to about the same height, but is generally more hairy, the leaflets narrower and more deeply toothed, and the flowers perhaps a trifle smaller. The stipules, however, will generally serve to distinguish it. These are large, broad, ovate, acute at the apex, sharply and deeply notched, and so much like leaves that but for their position at the base of the leaf stems they might easily be mistaken for them.

With the exception of the name American ipecac applied to this plant, the common names of *Porteranthus trifoliatus* are also used for *P. stipulatus*. The roots of both species are collected and used for the same purposes.

Description of roots.—The root of *Porteranthus trifolius* is thick and knotty, with many smoothish, reddish brown rootlets (Pl. V, fig. 1), the latter in drying becoming wrinkled lengthwise and showing a few transverse fissures or breaks in the bark, and the interior white and woody. There is practically no odor, and the woody portion is tasteless, but the bark, which is readily separable, is bitter, increasing the flow of saliva.

Porteranthus stipulatus has a larger, more knotty root, with rootlets that are more wavy, constricted, or marked with numerous transverse rings, and the bark fissured or breaking from the white woody portion at frequent intervals.

Collection, prices, and uses.—The roots of both species are collected in autumn. The price ranges from 2 to 4 cents a pound.

Indian-physic or bowman's root, as these names imply, was a popular remedy with the Indians, who used it as an emetic. From them the white settlers learned of its properties, and it is still used for its emetic action. This drug was at one time official in the United States Pharmacopœia, from 1820 to 1880. Its action is said to resemble that of ipecac.



FIG. 16.—Wild indigo (*Baptisia tinctoria*), branch showing flowers and seed pods. (Modified from Barton's Vegetable Materia Medica.)

WILD INDIGO.

Baptisia tinctoria (L.) R. Br.

Other common names.—Baptisia, indigo-weed, yellow indigo, American indigo, yellow broom, indigo-broom, clover-broom, broom-clover, horsefly-weed, shoofly, rattlebush.

Habitat and range.—This native herb grows on dry, poor land, and is found from Maine to Minnesota, south to Florida and Louisiana.

Description of plant.—Many who have been brought up in the country will recognize in the wild indigo the plant so frequently used by farmers, especially in Virginia and Maryland, to keep flies away from horses, bunches of it being fastened to the harness for this purpose.

Wild indigo grows about 2 to 3 feet in height, and the cloverlike blossoms and leaves will show at once that it belongs to the same family as the common

clover, namely, the pea family (Fabaceæ). It is an erect, much-branched, very leafy plant, of compact growth, the 3-leaved, bluish green foliage somewhat resembling clover leaves. The flowers, as already stated, are like common clover flowers—that is, not like clover heads, but the single flowers composing these: they are bright yellow, about one-half inch in length, and are produced in numerous clusters which appear from June to September. The seed pods, on stalks longer than the calyx, are nearly globular or ovoid and are tipped with an awl-shaped style. (Fig. 16.)

Another species, said to possess properties similar to those of *Baptisia tinctoria*, and substituted for it, is *B. alba* R. Br., called the white wild indigo. This plant has white flowers and is found in the Southern States and on the plains of the Western States.

Description of root.—Wild indigo has a thick, knotty crown or head, with several stem scars, and a round, fleshy root, sending out cylindrical branches and rootlets almost 2 feet in length. The white woody interior is covered with a thick, dark-brown bark, rather scaly or dotted with small, wartlike excrescences. The root breaks with a tough, fibrous fracture. There is a scarcely perceptible odor, and the taste, which resides chiefly in the bark, is nauseous, bitter, and acrid.

Collection, prices, and uses.—The root of wild indigo is collected in autumn, and brings from 4 to 8 cents a pound.

Large doses of wild indigo are emetic and cathartic and may prove dangerous. It also has stimulant, astringent, and antiseptic properties, and is used as a local application to sores, ulcers, etc.

The herb is sometimes employed like the root, and the entire plant was official from 1830 to 1840.

In some sections the young tender shoots are used for greens, like those of the pokeweed, but great care must be exercised to gather them before they are too far advanced in growth, as otherwise bad results will follow.

A blue coloring matter has been prepared from the plant and used as a substitute for indigo, to which, however, it is very much inferior.

CRANE'S-BILL.

Geranium maculatum L.

Pharmacopœial name.—Geranium.

Other common names.—Spotted crane's-bill, wild crane's-bill, stork's-bill, spotted geranium, wild geranium, alunroot, alumbloom, chocolate-flower, crow-foot, dove-foot, old-maid's-nightcap, shameface.

Habitat and range.—Crane's-bill flourishes in low grounds and open woods from Newfoundland to Manitoba, south to Georgia and Missouri.

Description of plant.—This pretty perennial plant belongs to the geranium family (Geraniaceæ), and will grow sometimes to a height of 2 feet, but more generally it is only about a foot in height. The entire plant is more or less covered with hairs, and is erect and usually unbranched. The leaves are nearly circular or somewhat heart shaped in outline, 3 to 6 inches wide, deeply parted into three or five parts, each division again cleft and toothed. The basal leaves are borne on long stems, while those above have shorter stems. The flowers, which appear from April to June, are borne in a loose cluster; they are rose purple, pale or violet purple in color, about 1 inch or 1½ inches wide, the petals delicately veined and woolly at the base, and the sepals or calyx lobes with a bristle-shaped point, soft-hairy, the margins having a fringe of more bristly hairs. The fruit consists of a beaked capsule, springing open elastically, and dividing into five cells, each cell containing one seed. (Fig. 17.)

Description of rootstock.—When removed from the earth, the rootstock of crane's-bill (fig. 17) is about 2 to 4 inches long, thick, with numerous branches bearing the young buds for next season's growth, and scars showing the remains of stems of previous years, brown outside, white and fleshy internally, and with several stout roots. When dry, the rootstock turns a darker brown, is finely wrinkled externally, and has a rough, spiny appearance, caused by the shrinking of the buds and branches and the numerous stem scars with which the root is studded. Internally it is of a somewhat purplish color. Crane's-bill root is without odor and the taste is very astringent.

Collection, prices, and uses.—Crane's-bill root depends for its medicinal value on its astringent properties, and as its astringency is due to the tannin content, the root should, of course, be collected at that season of the year when it is richest in that constituent. Experiments have proved that the yield of tannin in crane's-bill is greatest just before flowering, which is in April or May, according to locality. It should, therefore, be collected just before the flowering period, and not, as is commonly the case, in autumn. The price of this root ranges from 4 to 8 cents a pound.

Crane's-bill root, which is official in the United States Pharmacopœia, is used as a tonic and astringent.



FIG. 17.—Crane's-bill (*Geranium maculatum*), flowering plant, showing also seed pods and rootstock.

SENECA SNAKEROOT.

Polygala senega L.

Pharmacopœial name.—Senega.

Other common names.—Senega snakeroot, Seneca-root, rattlesnake-root, mountain-flax.

Habitat and range.—Rocky woods and hillsides are the favorite haunts of this indigenous plant. It is found in such situations from New Brunswick and western New England to Minnesota and the Canadian Rocky Mountains, and south along the Allegheny Mountains to North Carolina and Missouri.

Description of plant.—The perennial root of this useful little plant sends up a number of smooth, slender, erect stems (as many as 15 to 20 or more),

sometimes slightly tinged with red, from 6 inches to a foot in height, and generally unbranched. The leaves alternate on the stem, are lance shaped or oblong lance shaped, thin in texture, 1 to 2 inches long, and stemless. The flowering spikes are borne on the ends of the stems and consist of rather crowded, small, greenish white, insignificant flowers. The flowering period of Seneca snakeroot is from May to June. The spike blossoms gradually, and when the lowermost flowers have already fruited the upper part of the spike is still in flower. The seed capsules are small and contain two black, somewhat hairy seeds. (Fig. 18.) The short slender stalks supporting these seed capsules have a tendency to break off from the main axis before the seed is fully mature, leaving the spike in a rather ragged-looking condition, and the yield of seed, therefore, is not very large. Seneca snakeroot belongs to

the milkwort family (Polygalaceæ).

A form of Seneca snakeroot, growing mostly in the North-Central States and distinguished by its taller stems and broader leaves, has been called *Polygala senega* var. *latifolia*.

Description of root.—Seneca snake-root (fig. 18) is described in the United States Pharmacopœia as follows: "Somewhat cylindrical, tapering, more or less flexuous, 3 to 15 cm. long and 2 to 8 mm. thick, bearing several similar horizontal branches and a few rootlets; crown knotty with numerous buds and short stem remnants; externally yellowish gray or brownish



FIG. 18.—Seneca snakeroot (*Polygala senega*), flowering plant with root.

yellow, longitudinally wrinkled, usually marked by a keel which is more prominent in perfectly dry roots near the crown; fracture short, wood light yellow, usually excentrically developed; odor slight, nauseating; taste sweetish, afterwards acid."

The Seneca snakeroots found in commerce vary greatly in size, that obtained from the South, which is really the official drug, being usually light colored and small. The principal supply of Seneca snakeroot now comes from Minnesota, Wisconsin, and farther northward, and this western Seneca snakeroot has a much larger, darker root, with a crown or head sometimes measuring 2 or 3 inches across and the upper part of the root very thick. It is also less twisted and not so distinctly keeled.

Seneca snakeroot is often much adulterated with the roots of other species of *Polygala* and of other plants.

Collection, prices, and uses.—The time for collecting Seneca snakeroot is in autumn. Labor conditions play a great part in the rise and fall of prices for this drug. It is said that very little Seneca snakeroot has been dug in the Northwest during 1906, due to the fact that the Indians and others who usually engage in this work were so much in demand as farm hands and railroad laborers, which paid them far better than the digging of Seneca snakeroot. Collectors receive from about 55 to 70 cents a pound for this root.

This drug, first brought into prominence as a cure for snake bite among the Indians, is now employed as an expectorant, emetic, and diuretic. It is official in the Pharmacopœia of the United States.

STILLINGIA.

Stillingia sylvatica L.

Pharmacopœial name.—*Stillingia*.

Other common names.—Queen's-delight, queen's-root, silverleaf, nettle-potato.

Habitat and range.—This plant is found in dry, sandy soil and in pine barrens from Maryland to Florida west to Kansas and Texas.

Description of plant.—Like most of the other members of the spurge family (*Euphorbiaceæ*) *stillingia* also contains a milky juice. This indigenous, herbaceous perennial is about 1 to 3 feet in height, bright green and somewhat fleshy, with crowded leaves of a somewhat leathery texture. The leaves are practically stemless and vary greatly in form, from lance shaped, oblong, to oval and elliptical, round toothed or saw toothed. The pale-yellow flowers, which appear from April to October, are borne in a dense terminal spike and consist of two kinds, male and female, the male flowers arranged in dense clusters around the upper part of the stalk and the female flowers occurring at the base of the spike. (Fig. 19.) The seeds are contained in a roundish 3-lobed capsule.



FIG. 19.—*Stillingia (Stillingia sylvatica)*, upper portion of plant and part of spike showing male flowers. (After Bentley and Trimen, Medicinal Plants.)

Description of root.—*Stillingia* consists of somewhat cylindrical or slenderly spindle-shaped roots from 6 inches to a foot in length, slightly branched, the yellowish white, porous wood covered with a rather thick, reddish brown, wrinkled bark, the whole breaking with a fibrous fracture. As found in commerce, *stillingia* is usually in short transverse sections, the ends of the sections

pinkish and fuzzy with numerous fine, silky bast fibers, and the bark showing scattered yellowish brown resin cells and milk ducts. It has a peculiar unpleasant odor, and a bitter, acrid, and pungent taste.

Collection, prices, and uses.—*Stillingia* root is collected late in autumn or early in spring, usually cut into short, transverse sections and dried. The price ranges from 3 to 5 cents a pound.

This root, which is official in the United States Pharmacopœia, has been a popular drug in the South for more than a century, and is employed principally as an alterative.

WILD SARSAPARILLA.

Aralia nudicaulis L.

Other common names.—False sarsaparilla, Virginian sarsaparilla, American sarsaparilla, small spikenard, rabbit's-root, shotbush, wild licorice.

Habitat and range.—Wild sarsaparilla grows in rich, moist woods from Newfoundland west to Manitoba and south to North Carolina and Missouri.

Description of plant.—This native herbaceous perennial, belonging to the ginseng family (*Araliaceæ*), produces a single, long-stalked leaf and flowering stalk from a very short stem, both surrounded or sheathed at the base by thin, dry scales. The leafstalk is about 12 inches long, divided at the top into three parts, each division bearing five oval, toothed leaflets from 2 to 5 inches long, the veins on the lower surface sometimes hairy.

The naked flowering stalk bears three spreading clusters of small, greenish flowers, each cluster consisting of from 12 to 30 flowers, produced from May to June, followed later in the season by purplish black roundish berries, about the size of the common elderberries. (Pl. V, fig. 2.)

Description of rootstock.—Wild sarsaparilla rootstock has a very fragrant, aromatic odor. Rabbits are said to be very fond of it, whence one of the common names, "rabbit's-root," is derived. The rootstock is rather long, horizontally creeping, somewhat twisted, and yellowish brown on the outside. (Pl. V, fig. 2.) The taste is warm and aromatic. The dried rootstock is brownish gray and wrinkled lengthwise on the outside, about one-fourth of an inch in thickness, the inside whitish with a spongy pith. The taste is sweetish and somewhat aromatic.

Collection, prices, and uses.—The root of wild sarsaparilla is collected in autumn, and brings from 5 to 8 cents a pound.

This has long been a popular remedy, both among the Indians and in domestic practice, and was official in the United States Pharmacopœia from 1820 to 1880. Its use is that of an alterative, stimulant, and diaphoretic, and in this it resembles the official sarsaparilla obtained from tropical America.

Similar species.—The American spikenard (*Aralia racemosa* L.), known also as spignet, spiceberry, Indian-root, petty-morrel, life-of-man, and old-man's-root, is employed like *Aralia nudicaulis*. It is distinguished from this by its taller, herbaceous habit, its much-branched stem from 3 to 6 feet high, and very large leaves consisting of thin, oval, heart-shaped, double saw-toothed leaflets. The small greenish flowers are arranged in numerous clusters, instead of only three as in *nudicaulis*, and also appear somewhat later, namely, from July to August. The berries are roundish, reddish brown, or dark purple.

The rootstock is shorter than that of *nudicaulis*, and much thicker, with prominent stem scars, and furnished with numerous, very long, rather thick roots. The odor and taste are stronger than in *nudicaulis*. It is also collected in autumn, and brings from 4 to 8 cents a pound.

The American spikenard occurs in similar situations as *nudicaulis*, but its range extends somewhat farther south, Georgia being given as the southern limit.

The California spikenard (*Aralia californica* Wats.) may be used for the same purposes as the other species. The plant is larger than *Aralia racemosa*, but otherwise is very much like it. The root is also larger than that of *A. racemosa*.

GINSENG.

Panax quinquefolium L.

Other common names.—American ginseng, sang, red-berry, five-fingers. (Pl. V, fig. 3.)

Habitat and range.—Ginseng is a native of this country, its favorite haunts being the rich, moist soil in hardwood forests from Maine to Minnesota southward to the mountains of northern Georgia and Arkansas. For some years ginseng has been cultivated in small areas from central New York to Missouri.

Description of plant.—Ginseng is an erect perennial plant growing from 8 to 15 inches in height, and bearing three leaves at the summit, each leaf consisting of five thin, stalked, ovate leaflets, long pointed at the apex, rounded or narrowed at the base, the margins toothed; the three upper leaflets are largest and the two lower ones smaller. From 6 to 20 greenish yellow flowers are produced in a cluster during July and August, followed later in the season by bright crimson berries. It belongs to the ginseng family (Araliaceæ).

Description of root.—Ginseng has a thick, spindle-shaped root, 2 to 3 inches long or more, and about one-half to 1 inch in thickness, often branched, the outside prominently marked with circles or wrinkles. (Pl. V, fig. 3.) The spindle-shaped root is simple at first, but after the second year it usually becomes forked or branched, and it is the branched root, especially if it resembles the human form, that finds particular favor in the eyes of the Chinese, who are the principal consumers of this root.

Ginseng root has a thick, pale yellowish white or brownish yellow bark, prominently marked with transverse wrinkles, the whole root fleshy and somewhat flexible. If properly dried, it is solid and firm. Ginseng has a slight aromatic odor, and the taste is sweetish and mucilaginous.

Collection and uses.—The proper time for digging ginseng root is in autumn, and it should be carefully washed, sorted, and dried. If collected at any other season of the year, it will shrink more and not have the fine plump appearance of the fall-dug root.

The National Dispensatory contains an interesting item concerning the collection of the root by the Indians. They gather the root only after the fruit has ripened, and it is said that they bend down the stem of ripened fruit before digging the root, covering the fruit with earth, and thus providing for future propagation. The Indians claim that a large percentage of the seeds treated in this way will germinate.

Although once official in the United States Pharmacopœia, from 1840 to 1880, it is but little used medicinally in this country except by the Chinese residents, most of the ginseng produced in this country being exported to China. The Chinese regard ginseng root as a panacea. It is on account of its commercial prominence that it is included in this paper.

Cultivation.—There is probably no plant that has become better known, at least by name, during the past ten years or more than ginseng. It has been heralded from north to south and east to west as a money-making crop. The

prospective ginseng grower must not fail to bear in mind, however, that financial returns are by no means immediate. Special conditions and unusual care are required in ginseng cultivation, diseases must be contended with, and a long period of waiting is in store for him before he can realize on his crop.

Either roots or seeds may be planted, and the best success with ginseng is obtained by following as closely as possible the conditions of its native habitat. Ginseng needs a deep, rich soil, and, being a plant accustomed to the shade of forest trees, will require shade, which can be supplied by the erection of lath sheds over the beds. A heavy mulch of leaves or similar well-rotted vegetable material should be applied to the beds in autumn.

If roots are planted, they are set in rows about 8 inches apart and 8 inches apart in the row. In this way a marketable product will be obtained sooner than if grown from seed. The seed is sown in spring or autumn in drills 6 inches apart and about 2 inches apart in the row. The plants remain in the seed bed for two years and are then transplanted, being set about 8 by 8 inches apart. It requires from five to seven years to obtain a marketable crop from the seed. Seed intended for sowing should not be allowed to dry out, as this is supposed to destroy its vitality.

Price.—The price of wild ginseng roots ranges from \$5 a pound upward. The cultivated root generally brings a lower price than the wild root, and southern ginseng roots are worth less than those from northern localities.

Exports.—The exports of ginseng for the year ended June 30, 1906, amounted to 160,949 pounds, valued at \$1,175,844.

WATER-ERYNGO.

Eryngium yuccifolium Michx.

Synonym.—*Eryngium aquaticum* L.

Other common names.—*Eryngium*, eryngo, button-snakeroot, corn-snakeroot, rattlesnake-master, rattlesnake-weed, rattlesnake-flag.

Habitat and range.—Although sometimes occurring on dry land, water-eryngo usually inhabits swamps and low, wet ground, from the pine barrens of New Jersey westward to Minnesota and south to Texas and Florida.

Description of plant.—The leaves of this plant are grasslike in form, rigid, 1 to 2 feet long, and about one-half inch or a trifle more in width; they are linear, with parallel veins, pointed, generally clasping at the base, and the margins bristly with soft, slender spines. The stout, furrowed stem reaches a height of from 2 to 6 feet, and is generally unbranched except near the top. The insignificant whitish flowers are borne in dense, ovate-globular, stout-stemmed heads, appearing from June to September, and the seed heads that follow are ovate and scaly. (Pl. V, fig. 4.) Water-eryngo belongs to the parsley family (Apiaceæ) and is native in this country.

Description of rootstock.—The stout rootstock is very knotty, with numerous short branches, and produces many thick, rather straight roots (Pl. V, fig. 4), both rootstock and roots of a dark-brown color, the latter wrinkled lengthwise. The inside of the rootstock is yellowish white. Water-eryngo has a somewhat peculiar, slightly aromatic odor, and a sweetish, mucilaginous taste at first, followed by some bitterness and pungency.

Collection, prices, and uses.—The root of this plant is collected in autumn and brings from 5 to 10 cents a pound.

Water-eryngo is an old remedy, and one of its early uses, as the several common names indicate, was for the treatment of snake bites. It was official in the United States Pharmacopœia from 1820 to 1860, and is employed now as a

diuretic and expectorant, and for promoting perspiration. In large doses it acts as an emetic, and the root, when chewed, excites a flow of saliva. It is said to resemble Seneca snakeroot in action.

AMERICAN ANGELICA.

Angelica atropurpurea L.

Synonym.—*Archangelica atropurpurea* Hoffm.

Other common names.—Angelica, purple-stemmed angelica, great angelica, high angelica, purple angelica, masterwort.

Habitat and range.—American angelica is a native herb; common in swamps and damp places from Labrador to Delaware and west to Minnesota.

Description of plant.—This strong-scented, tall, stout perennial reaches a height of from 4 to 6 feet, with a smooth, dark-purple, hollow stem 1 to 2 inches in diameter. The leaves are divided into three parts, each of which is again divided into threes; the rather thin segments are oval or ovate, somewhat acute, sharply toothed and sometimes deeply cut, and about 2 inches long. The lower leaves sometimes measure 2 feet in width, while the upper ones are smaller, but all have very broad expanded stalks. The greenish white flowers are produced from June to July in somewhat roundish, many-rayed umbels or heads, which sometimes are 8 to 10 inches in diameter. The fruits are smooth, compressed, and broadly oval. (Pl. VI, fig. 1.) American angelica belongs to the parsley family (Apiaceæ).

Description of root.—American angelica root is branched, from 3 to 6 inches long, and less than an inch in diameter. The outside is light brownish gray, with deep furrows, and the inside nearly white, the whole breaking with a short fracture and the thick bark showing fine resin dots. It has an aromatic odor, and the taste at first is sweetish and spicy, afterwards bitter. The fresh root is said to possess poisonous properties.

The root of the European or garden angelica (*Angelica officinalis* Moench) supplies much of the angelica root of commerce. This is native in northern Europe and is very widely cultivated, especially in Germany, for the root.

Collection, prices, and uses.—The root is dug in autumn and carefully dried. Care is also necessary in preserving the root, as it is very liable to the attacks of insects. American angelica root ranges from 6 to 10 cents a pound.

American angelica root, which was official in the United States Pharmacopœia from 1820 to 1860, is used as an aromatic, tonic, stimulant, carminative, diuretic, and diaphoretic. In large doses it acts as an emetic.

The seeds are also employed medicinally.

YELLOW JASMINE OR JESSAMINE.

Gelsemium sempervirens (L.) Ait. f.

Pharmacopœial name.—Gelsemium.

Other common names.—Carolina jasmine or jessamine, Carolina wild woodbine, evening trumpet-flower.

Habitat and range.—Yellow jasmine is a plant native to the South, found along banks of streams, in woods, lowlands, and thickets, generally near the coast, from the eastern part of Virginia to Florida and Texas, south to Mexico and Guatemala.

Description of plant.—This highly ornamental climbing or trailing plant is abundantly met with in the woods of the Southern States, its slender stems festooned over trees and fences and making its presence known by the delight-

ful perfume exhaled by its flowers, filling the air with a fragrance that is almost overpowering wherever the yellow jasmine is very abundant.

The smooth, shining stems of this beautiful vine sometimes reach a length of 20 feet. The leaves are evergreen, lance shaped, entire, $1\frac{1}{2}$ to 3 inches long, rather narrow, borne on short stems, and generally remaining on the vine during the winter. The flowers, which appear from January to April, are bright yellow, about 1 to $1\frac{1}{2}$ inches long, the corolla funnel shaped. (Fig. 20.) They are very fragrant, but poisonous, and it is stated that the eating of honey derived from jasmine flowers has brought about fatal results.

Yellow jasmine is a perennial, and belongs to a family that is noted for its poisonous properties, namely, the Logania family (Loganiaceæ), which numbers among its members such powerful poisonous agents as the strychnine-producing tree.

Description of rootstock.—The rootstock of the yellow jasmine is horizontal and runs near the surface of the ground, attaining great length, 15 feet or more; it is branched, and here and there produces fibrous rootlets. When freshly removed from the ground it is very yellow, with a peculiar odor and bitter taste. For the drug trade it is generally cut into pieces varying from 1 inch to 6 inches in length, and when dried consists of cylindrical sections about 1 inch in thickness, the roots, of course, thinner. The bark is thin, yellowish brown, with fine silky bast fibers, and the wood is tough and pale yellow, breaking with a splintery fracture and showing numerous fine rays radiating from a small central pith. Yellow jasmine has a bitter taste and a pronounced heavy odor.

Collection, prices, and uses.—The root of yellow jasmine is usually collected just after the plant has come into flower and is cut into pieces from

1 to 6 inches long. It is often adulterated with portions of the stems, but these can be distinguished by their thinness and dark purplish color. The prices range from 3 to 5 cents a pound.

Yellow jasmine, which is official in the United States Pharmacopœia, is used for its powerful effect on the nervous system.

PINKROOT.

Spigelia marilandica L.

Pharmacopœial name.—Spigelia.

Other common names.—Carolina pinkroot, Carolina pink, Maryland pink, Indian pink, starbloom, wormgrass, wormweed, American wormroot.



FIG. 20.—Yellow jasmine (*Gelsemium sempervirens*).

Habitat and range.—This pretty little plant is found in rich woods from New Jersey to Florida, west to Texas and Wisconsin, but occurring principally in the Southern States. It is fast disappearing, however, from its native haunts.

Description of plant.—Pinkroot belongs to the same family as the yellow jasmine, namely, the Logania family (Loganiaceæ), noted for its poisonous species. It is a native perennial herb, with simple, erect stem 6 inches to 1½ feet high, nearly smooth. The leaves are stemless, generally ovate, pointed at the apex and rounded or narrowed at the base; they are from 2 to 4 inches long, one-half to 2 inches wide, smooth on the upper surface, and only slightly hairy on the veins on the lower surface. The rather showy flowers are produced from May to July in a terminal one-sided spike; they are from 1 to 2 inches in length, somewhat tube shaped, narrowed below, slightly inflated toward the center, and again narrowed or contracted toward the top, and terminating in five lance-shaped lobes; the flowers are very showy, with their brilliant coloring—bright scarlet on the outside, and the inside of the tube and the lobes a bright yellow. The seed capsule is double, consisting of two globular portions more or less united, and containing numerous seeds. (Pl. VI, fig. 2.)

Description of rootstock.—The rootstock is rather small, from 1 to 2 inches in length and about one-sixteenth of an inch in thickness. It is somewhat crooked or bent, dark brown, with a roughened appearance of the upper surface caused by cup-shaped scars, the remains of former annual stems. The lower surface and the sides have numerous long, finely branched, lighter colored roots, which are rather brittle. Pinkroot has a pleasant, aromatic odor, and the taste is described as sweetish, bitter, and pungent.

Collection, prices, and uses.—Pinkroot is collected after the flowering period. It is said to be scarce, and was reported as becoming scarce as long ago as 1830. The price paid to collectors ranges from 25 to 40 cents a pound.

The roots of other plants, notably those of the East Tennessee pinkroot (*Ruellia ciliosa* Pursh), are often found mixed with the true pinkroot, and the *Ruellia ciliosa* is even substituted for it. This adulteration or substitution probably accounts for the inertness which has sometimes been attributed to the true pinkroot and which has caused it to fall into more or less disuse. It has long been known that the true pinkroot was adulterated, but this adulteration was supposed to be caused by the admixture of Carolina phlox (*Phlox carolina* L., now known as *Phlox ovata* L.), but this is said now to be no part of the substitution.^a

The rootstock of *Ruellia ciliosa* is larger and not as dark as that of the Maryland pinkroot and has fewer and coarser roots, from which the bark readily separates, leaving the whitish wood exposed.

Pinkroot was long known by the Indians, and its properties were made known to physicians by them. It is official in the United States Pharmacopœia, and is used principally as an anthelmintic.

AMERICAN COLOMBO.

Frasera carolinensis Walt.

Synonym.—*Frasera walteri* Michx.

Other common names.—*Frasera*, meadowpride, pyramid-flower, pyramid-plant, Indian lettuce, yellow gentian, ground-centaury.

^a Bulletin 100, Part V, Bureau of Plant Industry, "The Drug Known as Pinkroot."

Habitat and range.—American colombo occurs in dry soil from the western part of New York to Wisconsin, south to Georgia and Kentucky.

Description of plant.—During the first and second year of the growth of this plant only the root leaves are produced. These are generally somewhat rounded at the summit, narrowed toward the base, and larger than the stem leaves, which develop in the third year. The leaves are deep green and produced mostly in whorls of four, the stem leaves being 3 to 6 inches in length and oblong or lance shaped. In the third year the stem is developed and the flowers are produced from June to August. The stem is stout, erect, cylindrical, and 3 to 8 feet in height. The flowers of American colombo are borne in large

terminal, handsome pyramidal clusters sometimes 2 feet in length, and are greenish yellow or yellowish white, dotted with brown purple. They are slender stemmed, about 1 inch across, with a wheel-shaped, 4-parted corolla. The seeds are contained in a much compressed capsule. (Fig. 21.) American colombo is an indigenous perennial, and belongs to the gentian family (*Gentianaceæ*).

Description of root.—The root is long, horizontal, spindle shaped, yellow, and wrinkled. In the fresh state it is fleshy and quite heavy. The American colombo root of commerce, formerly in transverse slices, now generally occurs in lengthwise slices. The outside is



FIG. 21.—American colombo (*Frasera carolinensis*), leaves, flowers, and seed pods.

yellowish or pale orange and the inside spongy and pale yellow. The taste is bitter. American colombo root resembles the official gentian root in taste and odor, and the uses are also similar.

Collection, prices, and uses.—The proper time for collecting American colombo root is in the autumn of the second year or in March or April of the third year. It is generally cut into lengthwise slices before drying. The price of American colombo root ranges from 3 to 5 cents a pound.

The dried root, which was official in the United States Pharmacopœia from 1820 to 1880, is used as a simple tonic. In the fresh state the root possesses emetic and cathartic properties.

BLACK INDIAN HEMP.

Apocynum cannabinum L.*Pharmacopœial name.*—Apocynum.*Other common names.*—Canadian hemp, American hemp, amy-root, bowman's-root, bitterroot, Indian-physic, rheumatism-weed, milkweed, wild cotton, Choc-taw-root.

The name "Indian hemp" is often applied to this plant, but it should never be used without the adjective "black." "Indian hemp" is a name that properly belongs to *Cannabis indica*, a true hemp plant, from which the narcotic drug "hashish" is obtained.

Habitat and range.—Black Indian hemp is a native of this country, and may be found in thickets and along the borders of old fields throughout the United States.

Description of plant.—This is a common herbaceous perennial about 2 to 4 feet high, with erect or ascending branches, and, like most of the plants belonging to the dogbane family (Apocynaceæ), contains a milky juice. The short-stemmed opposite leaves are oblong, lance-shaped oblong or ovate-oblong, about 2 to 6 inches long, usually sharp pointed, the upper surface smooth and the lower sometimes hairy. The plant is in flower from June to August and the small greenish white flowers are borne in dense heads, followed later by the slender pods, which are about 4 inches in length and pointed at the apex. (Fig. 22.)

Other species.—Considerable confusion seems to exist in regard to which species yields the root which has proved of greatest value medicinally. The Pharmacopœia directs that "the dried rhizome and roots of *Apocynum cannabinum* or of closely allied species of Apocynum" be used.

In the older botanical works and medical herbals only two species of Apocynum were recognized, namely, *A. cannabinum* L. and *A. androsaemifolium* L., although it was known that both of these were very variable. In the newer botanical manuals both of these species still hold good, but the different forms and variations are now recognized as distinct species, those formerly referred to *cannabinum* being distinguished by the erect or nearly erect lobes of the corolla, and those of the *androsaemifolium* group being distinguished by the spreading or recurved lobes of the corolla.

Among the plants that were formerly collected as *Apocynum cannabinum* or varietal forms of it, and which are now considered as distinct species, may be mentioned the following:

Riverbank-dogbane (*A. album* Greene), which frequents the banks of rivers and similar moist locations from Maine to Wisconsin, Virginia, and Missouri.



FIG. 22.—Black Indian hemp (*Apocynum cannabinum*), flowering portion, pods, and rootstock. (After King's American Dispensatory.)

This plant is perfectly smooth and has white flowers and relatively smaller leaves than *A. cannabinum*.

Velvet dogbane (*A. pubescens* R. Br.), which is common from Virginia to Illinois, Iowa, and Missouri. The entire plant has a soft, hairy or velvety appearance, which renders identification easy. According to the latest edition of the National Standard Dispensatory it is not unlikely that this is the plant that furnishes the drug that has been so favorably reported upon.

Apocynum androsaemifolium is also gathered by drug collectors for *Apocynum cannabinum*. Its root is likewise employed in medicine, but its action is not the same as that of *cannabinum*, and it should therefore not be substituted for it. It closely resembles *cannabinum*.

Description of rootstock.—The following description of the drug as found in commerce is taken from the United States Pharmacopœia: "Of varying length, 3 to 8 mm. thick, cylindrical or with a few angles produced by drying, lightly wrinkled longitudinally, and usually more or less fissured transversely; orange-brown, becoming gray-brown on keeping; brittle; fracture sharply transverse, exhibiting a thin brown layer of cork, the remainder of the bark nearly as thick as the radius of the wood, white or sometimes pinkish, starchy, containing laticiferous ducts; the wood yellowish, having several rings, finely radiate and very coarsely porous; almost inodorous, the taste starchy, afterwards becoming bitter and somewhat acrid."

Collection, prices, and uses.—The root of black Indian hemp is collected in autumn and brings from 8 to 10 cents a pound.

It is official in the United States Pharmacopœia and has emetic, cathartic, diaphoretic, expectorant, and diuretic properties, and on account of the last-named action it is used in dropsical affections.

The tough fibrous bark of the stalks of black Indian hemp was employed by the Indians as a substitute for hemp in making twine, fishing nets, etc.

PLEURISY-ROOT.

Asclepias tuberosa L.

Pharmacopœial name.—*Asclepias*.

Other common names.—Butterfly-weed, Canada-root, Indian-posy, orange-root, orange swallowwort, tuberroot, whiteroot, windroot, yellow or orange milkweed.

Habitat and range.—Pleurisy-root flourishes in the open or in pine woods, in dry sandy or gravelly soil, usually along the banks of streams. Its range extends from Ontario and Maine to Minnesota, south to Florida, Texas, and Arizona, but it is found in greatest abundance in the South.

Description of plant.—This is a very showy and ornamental perennial plant, indigenous to this country, and belonging to the milkweed family (*Asclepiadaceæ*); it is erect and rather stiff in habit, but with brilliant heads of bright orange-colored flowers that attract attention from afar.

The stems are rather stout, erect, hairy, about 1 to 2 feet in height, sometimes branched near the top, and bearing a thick growth of leaves. These are either stemless or borne on short stems, are somewhat rough to the touch, 2 to 6 inches long, lance shaped or oblong, the apex either sharp pointed or blunt, with a narrow, rounded, or heart-shaped base. The flower heads, borne at the ends of the stem and branches, consist of numerous, oddly shaped orange-colored flowers. The corolla is composed of five segments, which are reflexed or turned back, and the crown has five erect or spreading "hoods," within each of which is a slender incurved horn. The plant is in flower for some

time, usually from June to September, followed late in fall by pods, which are from 4 to 5 inches long, green, tinged with red, finely hairy on the outside, and containing the seeds with their long silky hairs. (Pl. VI, fig. 3.) Unlike the other milkweeds, the pleurisy-root contains little or no milky juice.

Description of root.—The root of this plant is large, white and fleshy, spindle shaped, branching. (Pl. VI, fig. 3.) As found in commerce it consists of lengthwise or crosswise pieces from 1 to 6 inches in length and about three-fourths of an inch in thickness. It is wrinkled lengthwise and also transversely and has a knotty head. The thin bark is orange brown and the wood yellowish, with white rays. It has no odor, and a somewhat bitter, acrid taste.

Collection, prices, and uses.—The root, which is usually found rather deep in the soil, is collected in autumn, cut into transverse or lengthwise slices, and dried. The price ranges from 6 to 10 cents a pound.

Pleurisy-root was much esteemed by the Indians, has long been used in domestic practice, and is official in the United States Pharmacopœia. It is used in disordered digestion and in affections of the lungs, in the last-named instance to promote expectoration, relieve pains in the chest, and induce easier breathing. It is also useful in producing perspiration.

Other species.—Besides the official pleurisy-root there are two other species of *Asclepias* which are employed to some extent for the same purposes, namely, the common milkweed and the swamp-milkweed.

The common milkweed (*Asclepias syriaca* L.) is a perennial, native in fields and waste places from Canada to North Carolina and Kansas. It has a stout, usually simple stem 3 to 5 feet in height and oblong or oval leaves, smooth on the upper surface and densely hairy beneath. The flowers, similar in form to those of *Asclepias tuberosa*, are pinkish purple and appear from June to August, followed by erect pods 3 to 5 inches long, wooly with matted hairs and covered with prickles and borne on recurved stems. The plant contains an abundance of milky juice.

The root of the common milkweed is from 1 to 6 feet long, cylindrical, and finely wrinkled. The short branches and scars left by former stems give the root a rough, knotty appearance. The bark is thick, grayish brown, and the inside white, the root breaking with a short, splintery fracture. Common milkweed root has a very bitter taste, but no odor.

It is collected in autumn and cut into transverse slices before drying. Common milkweed root ranges from 6 to 8 cents a pound.

Swamp-milkweed (*Asclepias incarnata* L.) is a native perennial herb found in swamps from Canada to Tennessee and Kansas. The slender stem, leafy to the top, is 1 to 2 feet in height, branched above, the leaves lance shaped or oblong lance shaped. The flowers, also similar to those of *tuberosa*, appear from July to September, and are flesh colored or rose colored. The pods are 2 to 3½ inches long, erect, and very sparingly hairy.

The root of the swamp-milkweed, which is also collected in autumn, is not quite an inch in length, hard and knotty, with several light-brown rootlets. The tough white wood, which has a thick central pith, is covered with a thin, yellowish brown bark. It is practically without odor, and the taste, sweetish at first, finally becomes bitter. This root brings about 3 cents a pound.

COMFREY.

Symphytum officinale L.

Other common names.—Symphytum, healing-herb, knitback, ass-ear, backwort, blackwort, bruisewort, gum-plant, slippery-root.

Habitat and range.—Comfrey is naturalized from Europe, and occurs in waste places from Newfoundland to Minnesota, south to Maryland.

Description of plant.—This coarse, rough, hairy perennial herb is from 2 to 3 feet high, erect and branched, with thick, rough leaves, the lower ones ovate lance shaped, 3 to 10 inches long, pointed at the apex, and narrowed at the base into margined stems. The uppermost leaves are lance shaped, smaller, and stemless. Comfrey is in flower from June to August, the purplish or dirty-white, tubular, bell-shaped flowers numerous and borne in dense terminal clusters. (Pl. VI, fig. 4.) The nutlets which follow are brown, shining, and somewhat wrinkled. Comfrey belongs to the borage family (Boraginaceæ).

Description of root.—Comfrey has a large, deep, spindle-shaped root, thick and fleshy at the top, white inside, and covered with a thin, blackish brown bark. (Pl. VI, fig. 4.) The dried root is hard, black, and very deeply and roughly wrinkled, breaking with a smooth, white, waxy fracture. As it occurs in commerce it is in pieces ranging from about an inch to several inches in length, only about one-fourth of an inch in thickness, and usually considerably bent. It has a very mucilaginous, somewhat sweetish and astringent taste, but no odor.

Collection, prices, and uses.—The root is dug in autumn, or sometimes in early spring. Comfrey root when first dug is very fleshy and juicy, but about four-fifths of its weight is lost in drying. The price ranges from 4 to 8 cents a pound.

The mucilaginous character of comfrey root renders it useful in coughs and diarrheal complaints. Its action is demulcent and slightly astringent.

The leaves are also used to some extent.

STONEROOT.

Collinsonia canadensis L.

Other common names.—Collinsonia, knobroot, knobgrass, knobweed, knotroot, horse-balm, horseweed, richweed, richleaf, ox-balm, citronella.

Habitat and range.—Stoneroot is found in moist, shady woods from Maine to Wisconsin, south to Florida and Kansas.

Description of plant.—Like most of the other members of the mint family (Menthaceæ), stoneroot is aromatic also, the fresh flowering plant possessing a very pleasant, lemon-like odor. It is a tall, perennial herb, growing as high as 5 feet. The stem is stout, erect, branched, smooth, or the upper part hairy.

The leaves are opposite, about 3 to 8 inches long, thin, ovate, pointed at the apex, narrowed or sometimes heart shaped at the base, and coarsely toothed; the lower leaves are largest and are borne on slender stems, while the upper ones are smaller and almost stemless. Stoneroot is in flower from July to October, producing large, loose, open terminal panicles or heads of small, pale-yellow lemon-scented flowers. The flowers have a funnel-shaped 2-lipped corolla, the lower lip larger, pendent, and fringed, with two very much protruding stamens. (Pl. VII, fig. 1.)

Description of root.—Even the fresh root of this plant is very hard. It is horizontal, large, thick, and woody, and the upper side is rough and knotty and branched irregularly. (Pl. VII, fig. 1.) The odor of the root is rather disagreeable, and the taste pungent and spicy. In the fresh state, as well as when dry, the root is extremely hard, whence the common name "stoneroot." The dried root is grayish brown externally, irregularly knotty on the upper surface from the remains of branches and the scars left by former stems, and the lower surface showing a few thin roots. The inside of the root is hard and whitish.

Collection, prices, and uses.—Stoneroot, which is collected in autumn, is employed for its tonic, astringent, diuretic, and diaphoretic effects. The price of the root ranges from 2 to 3½ cents a pound.

The leaves are used by country people as an application to bruises.

CULVER'S-ROOT.

Veronica virginica L.^a

Synonym.—*Leptandra virginica* (L.) Nutt.^a

Pharmacopæial name.—*Leptandra*.

Other common names.—Culver's-physic, blackroot, bowman's-root, Beaumont-root, Brinton-root, tall speedwell, tall veronica, physic-root, whorlywort.

Habitat and range.—This common indigenous herb is found abundantly in moist, rich woods, mountain valleys, meadows, and thickets from British Columbia south to Alabama, Missouri, and Nebraska.

Description of plant.—Culver's-root is a tall, slender-stemmed perennial belonging to the figwort family (Scrophulariaceæ). It is from 3 to 7 feet in height, with the leaves arranged around the simple stems in whorls of three to nine. The leaves are borne on very short stems, are lance shaped, long pointed at the apex, narrowed at the base, and sharply toothed, 3 to 6 inches in length, and 1 inch or less in width. The white tube-shaped flowers, with two long protruding stamens, are produced from June to September and are borne in several terminal, densely crowded, slender, spikelike heads from 3 to 9 inches long. (Fig. 23.)



FIG. 23.—Culver's-root (*Veronica virginica*), flowering top and rootstock.

^a Some authors hold that this plant belongs to the genus *Leptandra* and that its name should be *Leptandra virginica* (L.) Nutt. The Pharmacopœia is here followed.

The flowers, as stated, are usually white, though the color may vary from a pink to bluish or purple, and on account of its graceful spikes of pretty flowers it is often cultivated in gardens as an ornamental plant. The fruits are small, oblong, compressed, many-seeded capsules.

Description of rootstock.—After they are dried the rootstocks have a grayish brown appearance on the outside, and the inside is hard and yellowish, either with a hollow center or a brownish or purplish pith. When broken the fracture is tough and woody. The rootstock measures from 4 to 6 inches in length, is rather thick and bent, with branches resembling the main rootstock. The upper surface has a few stem scars, and from the sides and underneath numerous coarse, brittle roots are produced, which have the appearance of having been artificially inserted into the rootstock. (Fig. 23.) Culver's-root has a bitter and acrid taste, but no odor.

Collection, prices, and uses.—The rootstock and roots should be collected in the fall of the second year. When fresh these have a faint odor, resembling somewhat that of almonds, which is lost in drying. The bitter, acrid taste of Culver's-root also becomes less the longer it is kept, and it is said that it should be kept at least a year before being used. The price paid to collectors ranges from 6 to 10 cents a pound.

Culver's-root, which is official in the United States Pharmacopœia, is used as an alterative, cathartic, and in disorders of the liver.

DANDELION.

Taraxacum officinale Weber.^a

Synonyms.—*Taraxacum taraxacum* (L.) Karst.;^a *Taraxacum dens-leonis* Desf.

Pharmacopœial name.—*Taraxacum*.

Other common names.—Blow-ball, cankerwort, doon-head-clock, fortune-teller, horse gowan. Irish daisy, yellow gowan, one-o'clock. (Fig. 24.)

Habitat and range.—With the exception, possibly, of a few localities in the South, the dandelion is at home almost everywhere in the United States, being a familiar weed in meadows and waste places, and especially in lawns. It has been naturalized in this country from Europe and is distributed as a weed in all civilized parts of the world.

Description of plant.—It is hardly necessary to give a description of the dandelion, as almost everyone is familiar with the coarsely toothed, smooth, shining green leaves, the golden-yellow flowers which open in the morning and only in fair weather, and the round, fluffy seed heads of this only too plentiful weed of the lawns. In spring the young, tender leaves are much sought after by the colored market women about Washington, who collect them by the basketful and sell them for greens or salad.

Dandelion is a perennial belonging to the chicory family (Cichoriaceæ), and is in flower practically throughout the year. The entire plant contains a white milky juice.

Description of root.—The dandelion has a large, thick, and fleshy taproot, sometimes measuring 20 inches in length. In commerce, dandelion root is usually found in pieces 3 to 6 inches long, dark brown on the outside and strongly wrinkled lengthwise. It breaks with a short fracture and shows the thick

^aAlthough the combination *Taraxacum taraxacum* (L.) Karst. should be accepted by right of priority, the usage of the Pharmacopœia is followed.

whitish bark marked with circles of milk ducts and a thin woody center, which is yellow and porous. It is practically without odor and has a bitter taste.

Collection and uses.—Late in summer and in fall the milky juice becomes thicker and the bitterness increases, and this is the time to collect dandelion root. It should be carefully washed and thoroughly dried. Dandelion roots lose considerably in drying, weighing less than half as much as the fresh roots. The dried root should not be kept too long, as drying diminishes its medicinal activity. It is official in the United States Pharmacopœia.

Dandelion is used as a tonic in diseases of the liver and in dyspepsia.

Imports and prices.—

Most of the dandelion root found on the market is collected in central Europe. There has been an unusually large demand for dandelion root during the season of 1907, and according to the weekly records contained in the "Oil, Paint, and Drug Reporter," the imports

entered at the port of New York from January 1, 1907, to the end of May amounted to about 47,000 pounds. The price ranges from 4 to 10 cents a pound.



FIG. 24.—Dandelion (*Taraxacum officinale*).

QUEEN-OF-THE-MEADOW.

Eupatorium purpureum L.

Other common names.—Gravelroot, Indian gravelroot, joe-pye-weed, purple boneset, tall boneset, kidneyroot, king-of-the-meadow, marsh-milkweed, motherwort, niggerweed, quillwort, slunkweed, trumpetweed.

Habitat and range.—This common native perennial herb occurs in low grounds and dry woods and meadows from Canada to Florida and Texas.

Description of plant.—The stout, erect, green or purple stem of this plant grows from 3 to 10 feet in height, and is usually smooth, simple or branched at the top. The thin, veiny leaves are 4 to 12 inches long, 1 to 3 inches wide, ovate or ovate lance shaped, sharp pointed, toothed, and placed around the stem in whorls of three to six. While the upper surface of the leaves is smooth, there is usually a slight hairiness along the veins on the lower surface, otherwise smooth. Toward the latter part of the summer and in early fall queen-of-the-meadow is in flower, producing 5 to 15 flowered pink or purplish heads, all aggregated in large compound clusters, which present a rather showy appearance. (Pl. VII, fig. 2.) This plant belongs to the aster family (Asteraceæ).

Another species which is collected with this and for similar purposes, and by some regarded as only a variety, is the spotted boneset or spotted joe-pye-weed (*Eupatorium maculatum* L.). This is very similar to *E. purpureum*, but it does not grow so tall, is rough-hairy, and has the stem spotted with purple. The thicker leaves are coarsely toothed and in whorls of three to five, and the flower clusters are flattened at the top rather than elongated as in *E. purpureum*.

It is found in moist soil from New York to Kentucky, westward to Kansas, New Mexico, Minnesota, and as far up as British Columbia.

Description of root.—Queen-of-the-meadow root, as it occurs in commerce, is blackish and woody, furnished with numerous long dark-brown fibers, which are furrowed or wrinkled lengthwise and whitish within. It has a bitter, aromatic, and astringent taste.

Collection, prices, and uses.—The root is collected in autumn and is used for its astringent and diuretic properties. It was official in the United States Pharmacopœia from 1820 to 1840. The price ranges from 2½ to 4 cents a pound.

ELECAMPANE.

Inula helenium L.

Other common names.—Inula, inul, horseheal, elf-dock, elfwort, horse-elder, scabwort, yellow starwort, velvet dock, wild sunflower.

Habitat and range.—This perennial herb has been naturalized from Europe, and is found along roadsides and in fields and damp pastures from Nova Scotia to North Carolina, westward to Missouri and Minnesota. It is native also in Asia.

Description of plant.—When in flower elecampane resembles the sunflower on a small scale. Like the sunflower, it is a member of the aster family (Asteraceæ). It is a rough plant, growing from 3 to 6 feet in height, but producing during the first year only root leaves, which attain considerable size. In the following season the stout densely hairy stem develops, attaining a height of from 3 to 6 feet.

The leaves are broadly oblong in form, toothed, the upper surface rough and the under side densely soft-hairy. The basal or root leaves are borne on long stems, and are from 10 to 20 inches long and 4 to 8 inches wide, while the upper leaves are smaller and stemless or clasping.

About July to September the terminal flower heads are produced, either singly or a few together. As already stated, these flower heads look very much like small sunflowers, 2 to 4 inches broad, and consist of long, narrow, yellow rays, 3 toothed at the apex, and the disk also is yellow. (Pl. VII, fig. 3.)

Description of root.—Elecampane has a large, long, branching root, pale yellow on the outside and whitish and fleshy within. (Pl. VII, fig. 3.) When dry the outside turns a grayish brown or dark brown, and is generally finely wrinkled lengthwise. As found in commerce, elecampane is usually in transverse or lengthwise slices, light yellow or grayish and fleshy internally, dotted with numerous shining resin cells, and with overlapping brown and wrinkled bark. These slices become flexible in damp weather, and tough, but when they are dry they break with a short fracture. The root has at first a strongly aromatic odor, which has been described by some as resembling a violet odor, but this diminishes in drying. The taste is aromatic, bitterish, and pungent.

Collection, prices, and uses.—The best time for collecting elecampane is in the fall of the second year. If collected later than that the roots are apt to

be stringy and woody. Owing to the interlacing habit of the rootlets, much dirt adheres to the root, but it should be well cleaned, cut into transverse or lengthwise slices, and carefully dried in the shade. Collectors receive from 3 to 5 cents a pound for this root.

Elecampane, which was official in the United States Pharmacopœia of 1890, is much used in affections of the respiratory organs, in digestive and liver disorders, catarrhal discharges, and in skin diseases.

ECHINACEA.

Brauneria angustifolia (DC.) Heller.

Synonym.—*Echinacea angustifolia* DC.

Other common names.—Pale-purple coneflower, Sampson-root, niggerhead (in Kansas).

Habitat and range.—Echinacea is found in scattered patches in rich prairie soil or sandy soil from Alabama to Texas and northwestward, being most abundant in Kansas and Nebraska. Though not growing wild in the Eastern States, it has succeeded well under cultivation in the testing gardens of the Department of Agriculture at Washington, D. C.

Description of plant.—This native herbaceous perennial, belonging to the aster family (Asteraceæ), grows to a height of from 2 to 3 feet. It sends up a rather stout bristly-hairy stem, bearing thick rough-hairy leaves, which are broadly lance shaped or linear lance shaped, entire, 3 to 8 inches long, narrowed at each end, and strongly three nerved. The lower leaves have slender stems, but as they approach the top of the plant the stems become shorter and some of the upper leaves are stemless.

The flower heads, appearing from July to October, are very pretty, and the plant would do well as an ornamental in gardens. The flowers remain on the plant for a long time, and the color varies from whitish rose to pale purple. The heads consist of ray flowers and disk flowers, the former constituting the "petals" surrounding the disk, and the disk itself being composed of small, tubular, greenish yellow flowers. When the flowers first appear the disk is flattened or really concave, but as the flowering progresses it becomes conical in shape. The brown fruiting heads are conical, chaffy, stiff, and wiry. (Pl. VII, fig. 4.)

Description of root.—Echinacea has a thick, blackish root (Pl. VII, fig. 4), which in commerce occurs in cylindrical pieces of varying length and thickness. The dried root is grayish brown on the outside, the bark wrinkled lengthwise and sometimes spirally twisted. It breaks with a short, weak fracture, showing yellow or greenish yellow wood wedges, which give the impression that the wood is decayed.

The odor is scarcely perceptible, and the taste is mildly aromatic, afterwards becoming acrid and inducing a flow of saliva.

Collection, prices, and uses.—The root of echinacea is collected in autumn and brings from 20 to 30 cents a pound. It is said that echinacea varies greatly in quality, due chiefly to the locality in which it grows. According to J. U. Lloyd, the best quality comes from the prairie lands of Nebraska, and that from marshy places is inferior.

Echinacea is said to be an alterative, and to promote perspiration and induce a flow of saliva. The Indians used the freshly scraped roots for the cure of snake bites.

BURDOCK.

Arctium lappa L.*Synonym.*—*Lappa major* Gaertn.*Pharmacopœial name.*—Lappa.*Other common names.*—Cockle-button, cuckold-dock, beggar's-buttons, hurr-bur, stick-button, hardock, bardane. (Fig. 25.)*Habitat and range.*—Burdock, one of our most common weeds, was introduced from the Old World. It grows along roadsides, in fields, pastures, and waste places, being very abundant in the Eastern and Central States and in some scattered localities in the West.*Description of plant.*—Farmers are only too well acquainted with this coarse, unsightly weed. During the first year of its growth this plant, which is a biennial belonging to the aster family (Asteraceæ), produces only a rosette of large, thin leaves from a long tapering root. In the second year a round, fleshy, and branched stem is produced, the plant when full grown measuring from 3 to 7 feet in height. This stem is branched, grooved, and hairy, bearing very large leaves, the lower ones often measuring 18 inches in length. The leaves are placed alternately on the stem, on long, solid, deeply furrowed leafstalks; they are thin in texture, smooth on the upper surface, pale and woolly underneath; usually heart shaped, but sometimes roundish or oval, with even, wavy, or toothed margins.

FIG. 25.—Burdock (*Arctium lappa*), flowering branch and root.

The flowers are not produced until the second year, appearing from July until frost. Burdock flowers are purple, in small, clustered heads armed with hooked tips, and the spiny burs thus formed are a great pest, attaching themselves to clothing and to the wool and hair of animals. Burdock is a very prolific seed producer, one plant bearing as many as 400,000 seeds.

Description of root.—Burdock has a large, fleshy taproot (fig. 25), which, when dry, becomes scaly and wrinkled lengthwise and has a blackish brown or grayish brown color on the outside, hard, breaking with a short, somewhat fleshy fracture, and showing the yellowish wood with a whitish spongy center. Sometimes there is a small, white, silky tuft at the top of the root, which is formed by the remains of the bases of the leafstalks. The odor of the root is weak and unpleasant, the taste mucilaginous, sweetish, and somewhat bitter.

While the root is met with in commerce in its entire state, it is more frequently in broken pieces or in lengthwise slices, the edges of which are turned inward. The roots of other species of *Arctium* are also employed.

Collection, prices, and uses.—Burdock root is official, and the United States Pharmacopœia directs that it be collected from plants of the first year's growth, either of *Arctium lappa* or of other species of *Arctium*. As burdock has a rather large, fleshy root, it is difficult to dry and is apt to become moldy, and for this reason it is better to slice the root lengthwise, which will facilitate the drying process. The price ranges from 5 to 10 cents a pound. The best root is said to come from Belgium, where great care is exercised in its collection and curing.

Burdock root is used as an alterative in blood and skin diseases. The seeds and fresh leaves are also used medicinally to a limited extent.

PLATES.

EXPLANATION OF PLATES.

- PLATE I. Fig. 1.—Marginal-fruited shield-fern (*Dryopteris marginalis*), showing upper surface of leaf, the lower surface with the "sori," or "fruit dots," arranged on the margins, and the erect, chaffy rootstock. Fig. 2.—Skunk-cabbage (*Spathyema foetida*), showing flowering plant with thick rootstock and whorl of crowded roots; unfolded leaf and spathe laid open to show rounded spadix; also seedling, and transverse section of rootstock. Fig. 3.—Sweet-flag (*Acorus calamus*), showing swordlike leaves, flowering head produced from the side of the stalk, and long, creeping rootstock. Fig. 4.—Bethroot (*Trillium erectum*), showing leaves, various views of the flower, and root. Arrangement of the different parts of the plant is, in threes.
- PLATE II. Fig. 1.—Chamaelirium (*Chamaelirium luteum*), showing the male plant. Note the arrangement of the long-stemmed leaves along the entire stem and the graceful spike of feathery flowers, as compared with the grasslike basal leaves and the erect flowering spikes of Aletris (fig. 2), with which it is often confused. The rootstock of Chamaelirium, with the slightly curved upward end, is also shown. Fig. 2.—Aletris (*Aletris farinosa*). Note the grasslike leaves at the base of the stem and the erect spikes of urn-shaped flowers, as compared with the arrangement of the leaves all along the stem and the drooping plumelike spikes of Chamaelirium (fig. 1), with which Aletris is frequently confused. The rootstock of Aletris, which is rough and scaly and almost completely hidden by the fibrous roots, is, unfortunately, not well shown in the illustration. Fig. 3.—Wild yam (*Dioscorea villosa*), showing part of the vine, with its drooping clusters of flowers and 3-winged seed capsules; also the long, horizontal rootstock. Fig. 4.—Blue flag (*Iris versicolor*), showing sword-shaped leaves, the flowers, and part of the rootstock.
- PLATE III. Fig. 1.—Large yellow lady's-slipper (*Cypripedium hirsutum*), showing plant with its broad, parallel-veined leaves, and curious, baglike flower, and also rootstock with wavy roots. Fig. 2.—Canada snakeroot (*Asarum canadense*), showing, to the right, the flowering plant, and to the left the fruiting plant, together with the creeping rootstocks. Fig. 3.—Virginia serpentaria (*Aristolochia serpentaria*), plant showing seed capsules and rootstock. Fig. 4.—Soapwort (*Saponaria officinalis*), showing the upper flowering portion and seed pods; also the runners and roots.
- PLATE IV. Fig. 1.—Oregon grape (*Berberis aquifolium*), showing a branch with the leathery, holly-like leaves, and clusters of berries. Fig. 2.—Blue cohosh (*Caulophyllum thalictroides*), showing upper portion of the plant, with flowering head. Fig. 3.—Canada moonseed (*Menispermum canadense*), showing a portion of the vine in flower. Fig. 4.—Hydrangea (*Hydrangea arborescens*), showing a flowering and fruiting branch.
- PLATE V. Fig. 1.—Indian-physic (*Porteranthus trifoliatus*), showing upper flowering portion, and base of stem with root. Fig. 2.—Wild sarsaparilla (*Aralia nudicaulis*), showing flowering plant with rootstock, and to the left a fruiting head. Fig. 3.—Ginseng (*Panax quinquefolium*), showing the upper portion in flower, and the root. Fig. 4.—Water-eryngo (*Eryngium yuccifolium*), showing the long, grasslike leaves, stout-stemmed flowering heads, and rootstock.
- PLATE VI. Fig. 1.—American angelica (*Angelica atropurpurea*), showing leaves, fruiting head, and to the right a portion of the stem with broad, expanded leafstalk. Fig. 2.—Pinkroot (*Spigelia marilandica*), showing flowering top and seed capsules. Fig. 3.—Pleurisy-root (*Asclepias tuberosa*), showing flowering top, pods with escaping hairy seeds, and root. Fig. 4.—Comfrey (*Symphytum officinale*), showing the thick, rough leaves, the clusters of flowers, lower portion of plant with root, and sections of root.
- PLATE VII. Fig. 1.—Stoneroot (*Collinsonia canadensis*), showing flowering top and base of stem with root. Fig. 2.—Queen-of-the-meadow (*Eupatorium purpureum*), showing leaves and flowers. Fig. 3.—Elecampane (*Inula helenium*), showing leaves, flowers, and root. Fig. 4.—Echinacea (*Brauneria angustifolia*), showing flowering plant.

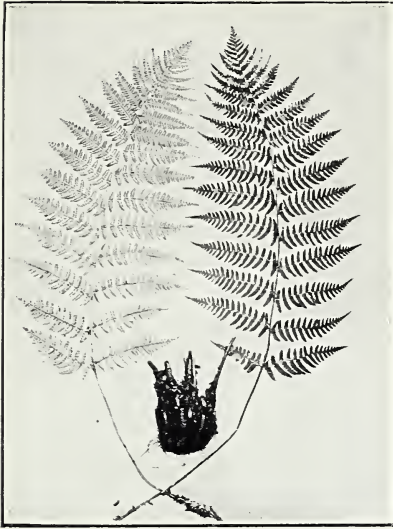


FIG. 1.—MARGINAL-FRUITED SHIELD-FERN
(*DRYOPTERIS MARGINALIS*).

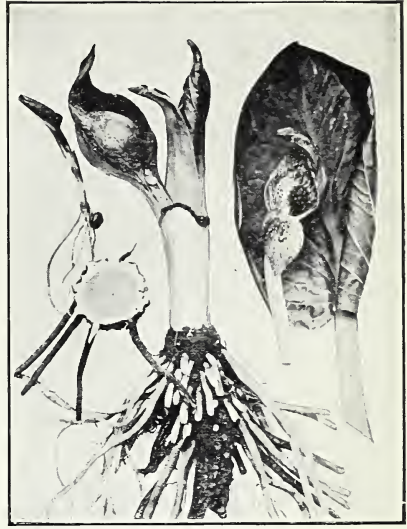


FIG. 2.—SKUNK-CABBAGE (*SPATHYEMA*
FOETIDA).

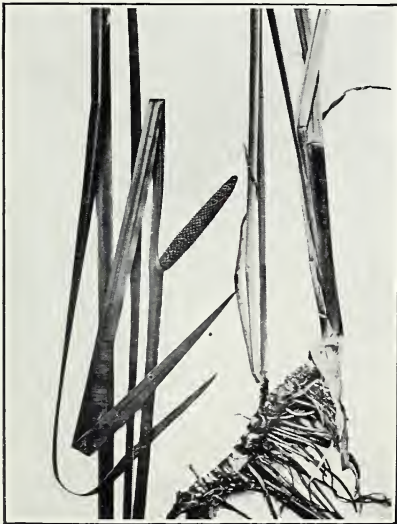


FIG. 3.—SWEET-FLAG (*ACORUS CALAMUS*).



FIG. 4.—BETHROOT (*TRILLIUM ERECTUM*).



FIG. 1.—CHAMAELIRIUM (*CHAMAELIRIUM LUTEUM*).



FIG. 2.—ALETRIS (*ALETRIS FARINOSA*).

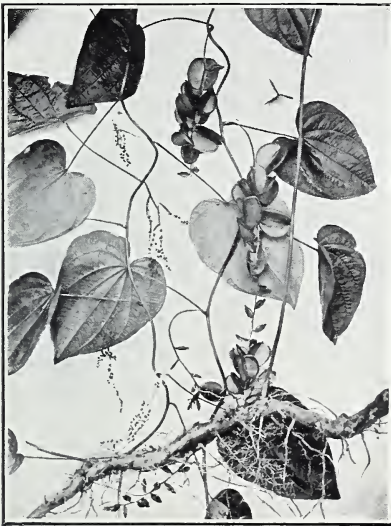


FIG. 3.—WILD YAM (*DIOSCOREA VILLOSA*).



FIG. 4.—BLUE FLAG (*IRIS VERSICOLOR*).



FIG. 1.—LARGE YELLOW LADY'S-SLIPPER
(*CYPRIPEDIUM HIRSUTUM*).



FIG. 2.—CANADA SNAKEROOT (*ASARUM
CANADENSE*).



FIG. 3.—VIRGINIA SERPENTARIA (*ARISTO-
LOCHIA SERPENTARIA*).



FIG. 4.—SOAPWORT (*SAPONARIA
OFFICINALIS*).



FIG. 1.—OREGON GRAPE (*BERBERIS AQUIFOLIUM*).



FIG. 2.—BLUE COHOSH (*CAULOPHYLLUM THALICTROIDES*).



FIG. 3.—CANADA MOONSEED (*MENISPERMUM CANADENSE*).



FIG. 4.—HYDRANGEA (*HYDRANGEA ARBORESCENS*).



FIG. 1.—INDIAN-PHYSIC (*PORTERANTHUS TRIFOLIATUS*).



FIG. 2.—WILD SARSAPARILLA (*ARALIA NUDICAULIS*).



FIG. 3.—GINSENG (*PANAX QUINQUEFOLIUM*).



FIG. 4.—WATER-ERYNGO (*ERYNGIUM YUCCIFOLIUM*).





FIG. 1.—AMERICAN ANGELICA (*ANGELICA ATROPURPUREA*).



FIG. 2.—PINKROOT (*SPIGELIA MARILANDICA*).



FIG. 3.—PLEURISY-ROOT (*ASCLEPIAS TUBEROSA*).



FIG. 4.—COMFREY (*SYMPHYTUM OFFICINALE*).



FIG. 1.—STONEROOT (*COLLINSONIA CANADENSIS*).



FIG. 2.—QUEEN-OF-THE-MEADOW (*EUPATORIUM PURPUREUM*).



FIG. 3.—ELECAMPANE (*INULA HELENIUM*).



FIG. 4.—ECHINACEA (*BRAUNERIA ANGUSTIFOLIA*).

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